



VOLUME 1:
2012 TO 2014
**ENERGY EFFICIENCY/
PEAK DEMAND REDUCTION
(EE/PDR) ACTION PLAN**

November 29, 2011

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E EXECUTIVE SUMMARY

E.1 AEP Ohio's Commitment and Strategic Plan Goals

AEP Ohio is committed to helping customers use energy more efficiently by delivering cost-effective programs that provide value to all stakeholders.

The strategic goals of this 2012-2014 Energy Efficiency and Peak Demand Reduction (EE/PDR) Action Plan (Plan) are to:

- Deliver a comprehensive and cost-effective Plan providing the opportunity for participation by all customer rate classes and every major customer segment in every region of AEP Ohio's service territory.
- Reduce inefficient uses of electricity while improving customer productivity, comfort and safety.
- Provide additional customer financial resources through energy savings for other important needs and to offset rising costs.
- Help delay the need for new electricity generation and future related rate impacts.
- Provide the lowest cost alternative to new generation.
- Reduce the environmental impacts of fossil fuel generation facilities.
- Help provide sustainable green jobs in Ohio.
- Meet or exceed Ohio Senate Bill (SB) 221 energy efficiency and peak demand reduction requirements.¹
- Comply with Ohio Revised Code 4901:1-39 for Plan content.²

E.2 Summary of 2012-2014 EE/PDR Plan

This Plan is the second three-year plan developed and submitted for approval to the Public Utilities Commission of Ohio (PUCO) by AEP Ohio, following the current approved 2009-2011 EE/PDR Action Plan.³ The 2012-2014 Plan reflects the continuance of successful existing programs, with some modifications as noted to improve program success. In addition, new programs have been added to the Plan to encourage greater participation by customers. Segmentation has been added as a critical component, enabling the targeted marketing necessary to gain broad customer participation.

¹ http://www.legislature.state.oh.us/bills.cfm?ID=127_SB_221

² See <http://codes.ohio.gov/oac/4901%3A1-39>

³ See PUCO dockets 09-1089-EL-POR and 09-1090-EL-POR on the 2009-2011 EE/PDR Action Plan

Sustainability is very important as goals increase; therefore, the Plan has a more rigorous research and development function, including targeted development activities and a pilot process to support future program planning and development.

EE/PDR is an important resource for AEP Ohio and its customers, growing increasingly important as fuel and commodity prices become more volatile and environmental regulation becomes more stringent. Estimates of EE/PDR potential are a key input to the integrated resource planning process, which considers the load forecast and both supply-side and demand-side resources. The market potential study that informs this Plan is the result of an analysis of the EE/PDR potential in AEP Ohio's service territory by Navigant, an experienced EE/PDR consultant, under the direct supervision and guidance of AEP Ohio. The market potential study included the results of a recent baseline study completed in AEP Ohio's service territory and the direct experience of AEP Ohio in its current program Plan performance, as well as benchmarking and best practices program analyses from other utility programs.

Ohio law in SB 221 requires investor-owned electric utilities to achieve incremental energy savings each year through EE/PDR programs, with a cumulative 22.2 percent by the end of 2025. Utilities also must implement programs designed to reduce peak energy demand one percent beginning in 2009, and an additional 0.75 percent per year, for a total 7.75 percent through 2018. Table 1 presents SB 221 EE/PDR percent requirements and associated energy and summer peak demand requirements for 2012 through 2014, which is the focus of this EE/PDR Action Plan.

Table 1. SB 221 Savings Requirements (at Meter) – 2012 to 2014

SB 221 Requirements				
At Meter	Energy Savings (GWh)			
Year	Incremental		Cumulative (2009 Through)	
2012	0.8%	369	2.3%	1,052
2013	0.9%	426	3.2%	1,478
2014	1.0%	475	4.2%	1,953
At Meter	Peak Demand Savings (MW)			
Year	Incremental		Cumulative (2009 through)	
2012	0.75%	66.1	3.25%	279
2013	0.75%	69.3	4.00%	349
2014	0.75%	71.6	4.75%	420

AEP Ohio plans to meet or exceed the SB 221 savings requirements for 2012 to 2014, ensuring that all customer classes have energy saving opportunities. The Plan presents detailed information on the approach, energy efficiency and demand response measures and proposed incentive levels. AEP Ohio anticipates that portions of the Plan

will need to be adjusted during implementation in response to better information or changing market conditions. AEP Ohio will update the PUCO in accordance with the rules, and advise the AEP Ohio Collaborative regarding the need for any substantive revisions to this Plan.

E.3 Summary of EE/PDR Program Results

Table 2 presents the actual savings results submitted to the PUCO for 2009 and 2010 programs.

Table 2. EE/PDR Plan Savings Results (at Meter) – 2009 to 2010

EE/PDR Plan Savings Results 2009 to 2011						
At Meter	Energy Savings (GWh)					
Year	Incremental			Cumulative (2009 through)		
	SB 221 Requirement	GWh Achieved	Achievement as Percent of Sales	SB 221 Requirement	GWh Achieved	Achievement as Percent of Sales
2009	0.3%	253	0.6%	0.3%	253	0.6%
2010	0.5%	365	0.6%	0.8%	618	1.3%
At Meter	Peak Demand Savings (MW)					
Year	Incremental			Cumulative (2009 through)		
	SB 221 Requirement	MW Achieved	Achievement as Percent of Sales	SB 221 Requirement	MW Achieved	Achievement as Percent of Sales
2009	1.00%	390	4.7%	1.00%	390	4.7%
2010	0.75%	120	1.4%	1.75%	510	5.9%

E.4 EE/PDR Plan Summary

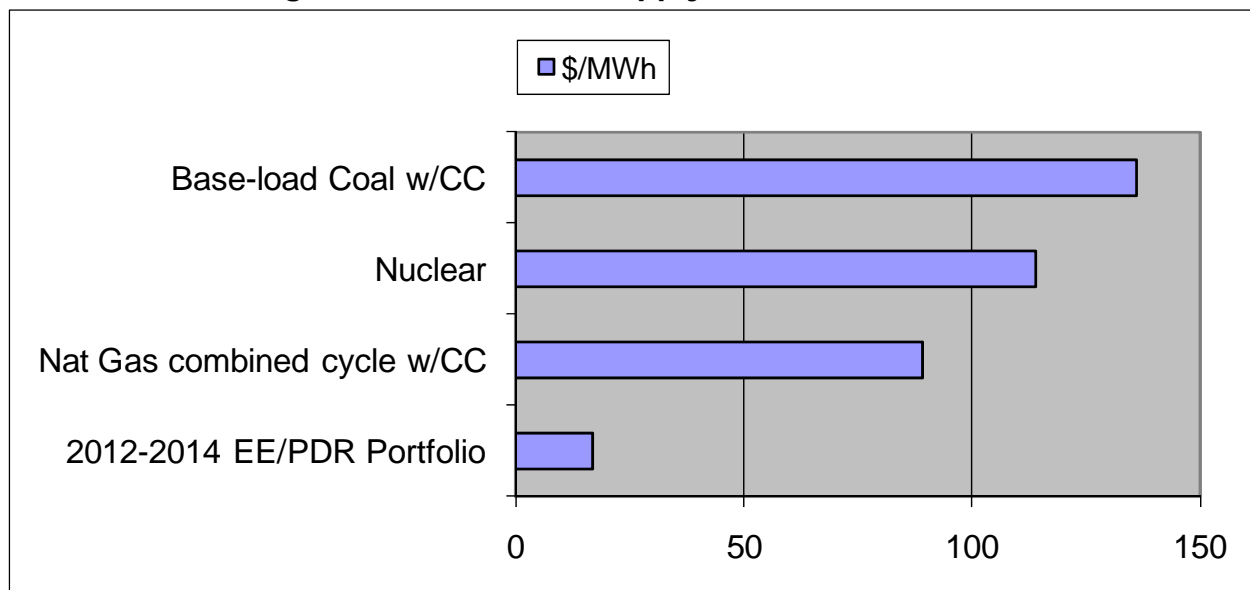
AEP Ohio proposes to invest a total of \$274.1 million on energy efficiency and demand response programs and projects full year savings of 1,651 GWh and 247 MW cumulative annual savings at the meter over a three-year period during calendar years 2012 to 2014. The total customer bill savings from this investment estimated over the life of the installed EE/PDR measures are projected at approximately \$880 million, using Participant Cost Test (PCT) net benefit results only including program costs. Further, the total net benefits based on the Total Resource Cost (TRC) test are projected to be about \$280 million. With every dollar of program investment yielding over two dollars in benefits, using the TRC test net benefit results.

The overall Plan projected first year annual cost per kWh saved is \$0.17/kWh (note that this cost is not comparable to a supply-side investment and is only used to compare programs and Plans at a high level for reasonableness of cost.) The 2012 to 2014 Plan

first year costs are projected to be higher than AEP Ohio's actual experience of \$0.11/kWh in 2009 through 2011 to date. The lower costs were driven primarily by "low hanging fruit" such as lighting measures in Consumer and Business sectors. This Plan anticipates these lower cost opportunities becoming less available over time, as AEP Ohio is already seeing in 2011 program participation experience. In addition, this Plan's cost is higher primarily due to reduced lighting savings resulting from changes in baselines due to federal lighting standards and projected deeper savings from higher cost, but still cost effective, measures and measure combinations. AEP Ohio's actual program experience with costs has been factored into the 2012-2014 Plan cost projections.

The lifetime cost of saved energy is estimated to be \$0.016/kWh for the 2012 to 2014 EE/PDR Plan. The lifetime cost of saved energy is more comparable to a supply-side generation investment alternative. At current supply-side generation investment costs, the EE/PDR Plan compares favorably and is the lowest cost alternative, as shown in Figure 1.

Figure 1. EE/PDR vs. Supply-Side Investments



Supply-side investments source: Energy Information Administration, Annual Energy Outlook 2011, December 2010, DOE/EIA-0383(2010).

The division of EE/PDR program investment between residential and business customers is commensurate with each sector's relative cost-effectiveness and contribution to the Plan. Table 3 provides the projected savings, associated funding for AEP Ohio's 2012 through 2014 program Plan, and projected net present value net benefits.

Table 3. Savings Goals and Efficiency Plan Investment – 2012 to 2014

Consumer Sector (incremental annual savings at meter)	2012	2013	2014	2012- 2014 Total	Net Present Value Net Benefits (million 2012\$)
Energy Savings (GWh)	211.2	220.6	207.9	564.0	
% Savings of Sector Sales	1.41%	1.49%	1.41%	3.82%	
2012-2014 Total is cumulative					
Demand Savings (MW)	23.9	26.3	28.7	68.8	
% Savings of Sector Sales	0.67%	0.74%	0.82%	-	
Demand Savings goals are not cumulative					
Total Cost (million \$)	\$35.1	\$37.1	\$38.6	\$110.8	
Note: Behavior Program energy and demand savings are not cumulative .					
Business Sector (incremental annual savings at meter)	2012	2013	2014	2012- 2014 Total	Net Present Value Net Benefits (million 2012\$)
Energy Savings (GWh)	337.9	365.8	383.4	1,087.1	
% Savings of Sector Sales	1.03%	1.11%	1.16%	3.29%	
2012-2014 Total is cumulative					
Demand Savings (MW)	72.4	70.6	70.5	178.5	
% Savings of Sector Sales	1.31%	1.25%	1.26%	-	
Demand Savings goals are not cumulative					
Total Cost (million \$)	\$45.5	\$50.5	\$55.5	\$151.6	
Note: Demand Response Program demand savings are not cumulative.					
Total Portfolio (incremental annual savings at meter)	2012	2013	2014	2012- 2014 Total	Net Present Value Net Benefits (million 2012\$)
Energy Savings (GWh)	549.0	586.4	591.3	1,651.1	
% Savings of Sector Sales	1.15%	1.23%	1.24%	3.46%	
2012-2014 Total is cumulative					
Demand Savings (MW)	96.3	96.8	99.2	247.3	
% Savings of Total Sales	1.05%	1.05%	1.08%	-	
Demand Savings are not cumulative					
Total Program Costs (million \$)	\$76.0	\$82.6	\$88.5	\$247.1	
Other Costs (million \$)	\$9.1	\$8.9	\$9.0	\$27.0	
Portfolio Total Investment (million \$)	\$85.1	\$91.5	\$97.5	\$274.1	\$280.7

(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency. AEP Ohio also will conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables, and Plan cost-benefit analysis.

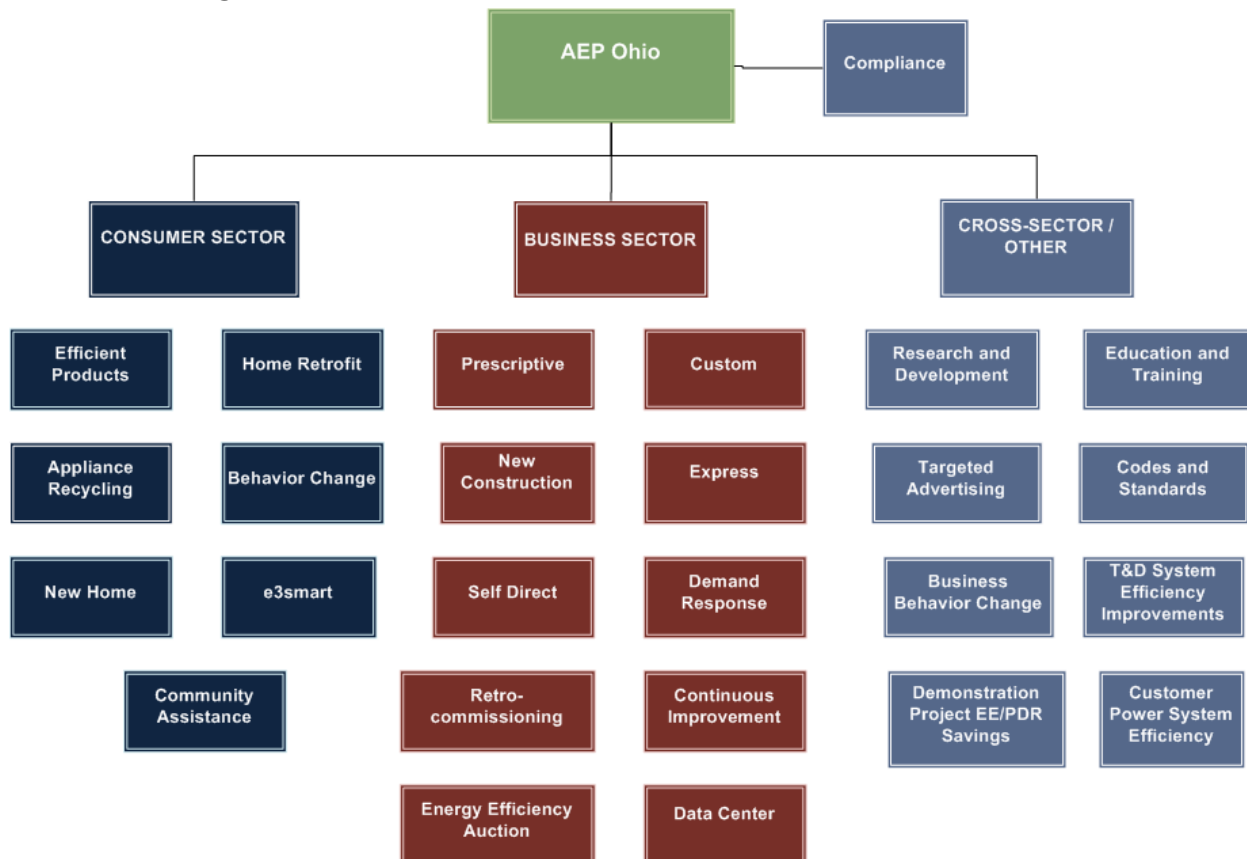
(2) Other Costs include support and other services, including Research and Development, General Education and Training, Targeted Advertising, Business Behavior Change, Codes and Standards, T&D System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency.

Incentive levels and other program elements will be reviewed and adjusted to reflect changes in market conditions or implementation processes in order to maximize cost-effective savings. Such modifications will be reported in the annual Plan status reports submitted to the PUCO.SM

Plan Structure

Figure 2 presents the proposed Plan structure, including seven consumer sector and ten business sector programs, as well as eight cross-sector programs and other activities. AEP Ohio also will conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables and Plan benefit-cost analysis. New Consumer Sector features include Multifamily, expansion of Efficient Appliance offerings and joint program efforts with Columbia Gas. New Business sector programs include Retro-commissioning, Continuous Improvement, Energy Efficiency Auction, and Data Center. New Cross-Sector or Other programs include an expanded Research and Development function, Codes and Standards Support, Business Behavior Change, T&D System Efficiency, gridSMART Demonstration Project EE/PDR Savings, and Customer Power System Efficiency.

Figure 2. EE/PDR Action Plan Structure – 2012 to 2014



E.5 Energy, Demand and Emissions Savings

Table 4 presents the projected incremental annual GWh energy savings for each year as well as 2012 to 2014 cumulative total, TRC test results, net present value net benefits in 2012 million dollars, lifetime energy saved in thousand MWh, and lifetime cost of saved energy in 2012 dollars per kWh over the three-year period from 2012 to 2014.

Table 4. Incremental Annual Energy (GWh) Savings at Meter – 2012 to 2014

Consumer Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total	Total Resource Cost Test (TRC)	Net Present Value Net Benefits (million 2012\$)	Lifetime Energy Saved (thousand MWh)	Lifetime Cost of Saved Energy (2012\$ / kWh)
Efficient Products	125.5	126.1	99.9	351.6	21.3%	2.3	\$71.96	3,376.8	\$0.009
Home Retrofit	10.9	10.8	13.7	35.4	2.1%	1.4	\$3.93	521.6	\$0.032
Appliance Recycling	19.0	22.0	29.0	70.0	4.2%	3.7	\$10.79	328.3	\$0.027
Behavior Change	35.1	40.6	46.3	46.3	2.8%	1.2	\$1.19	46.3	\$0.112
New Home	1.6	1.6	1.5	4.7	0.3%	1.0	-\$0.15	93.5	\$0.027
e ³ smart SM	7.1	7.1	6.5	20.6	1.2%	1.9	\$3.25	154.1	\$0.017
Community Assistance	12.1	12.4	10.9	35.3	2.1%	0.5	-\$13.67	364.9	\$0.073
Consumer Sector Total	211.2	220.6	207.9	564.0	34.2%	1.7	\$77.30	4,885.5	\$0.019
% Total of Consumer Sector Sales	1.41%	1.49%	1.41%	Behavior Modification is not cumulative (1 year measure life)					
Business Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total	Total Resource Cost Test (TRC)	Net Present Value Net Benefits (million 2012\$)	Lifetime Energy Saved (thousand MWh)	Lifetime Cost of Saved Energy (2012\$ / kWh)
Prescriptive	204.0	215.6	219.6	639.3	38.7%	2.0	\$129.88	6,520.5	\$0.008
Custom	66.5	68.3	67.5	202.2	12.2%	1.4	\$31.33	2,561.1	\$0.009
New Construction	10.0	10.0	10.0	30.0	1.8%	4.2	\$16.35	675.0	\$0.014
Express	9.7	10.6	11.1	31.4	1.9%	1.2	\$2.09	307.0	\$0.030
Self Direct	20.0	20.0	20.0	60.0	3.6%	2.1	\$12.76	600.0	\$0.030
Demand Response	0.0	0.0	0.0	0.0	0.0%	23.8	\$9.51	0.0	\$0.000
Retro-commissioning	3.7	5.6	7.3	16.5	1.0%	1.6	\$1.90	115.6	\$0.041
Continuous Improvement	10.0	15.0	20.0	45.0	2.7%	2.3	\$12.51	540.0	\$0.029
Energy Efficiency Auction	10.0	14.8	20.0	44.8	2.7%	2.2	\$12.32	537.6	\$0.029
Data Center	4.0	6.0	8.0	18.0	1.1%	1.4	\$1.74	143.6	\$0.042
Business Sector Total	337.9	365.8	383.4	1,087.1	65.8%	1.9	\$230.38	12,000.4	\$0.011
% Total of Business Sector Sales	1.03%	1.11%	1.16%						
PLAN TOTAL	549.0	586.4	591.3	1,651.1	100.0%	1.7	\$280.68	16,885.9	\$0.016
% Total of Total Sales	1.15%	1.23%	1.24%						

Table 5 presents the projected incremental annual summer peak demand MW savings levels as well as the cumulative total over the three-year period from 2012 to 2014.

Table 5. Incremental Annual Summer Peak Demand (MW) Savings at Meter – 2012 to 2014

Consumer Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total
Efficient Products	11.8	12.7	12.9	37.5	15.2%
Home Retrofit	0.7	0.7	0.9	2.3	0.9%
Appliance Recycling	3.7	4.3	5.8	13.8	5.6%
Behavior Change	4.7	5.4	6.2	6.2	2.5%
New Home	0.4	0.4	0.4	1.1	0.5%
e ³ smart SM	1.5	1.5	1.4	4.4	1.8%
Community Assistance	1.2	1.2	1.1	3.5	1.4%
Consumer Sector Total	23.9	26.3	28.7	68.8	27.8%
Percent Total of Sector Sales	0.67%	0.74%	0.82%	Behavior Change is not cumulative (1 year measure life)	
Business Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total
Prescriptive	34.0	35.9	36.6	106.5	43.1%
Custom	8.9	9.1	9.0	27.0	10.9%
New Construction	1.2	1.2	1.2	3.7	1.5%
Express	1.6	1.8	1.8	5.2	2.1%
Self Direct	2.5	2.5	2.5	7.4	3.0%
Demand Response	20.5	14.5	12.0	12.0	4.9%
Retro-commissioning	0.7	1.1	1.5	3.4	1.4%
Continuous Improvement	1.2	1.8	2.5	5.5	2.2%
Energy Efficiency Auction	1.2	1.8	2.5	5.5	2.2%
Data Center	0.5	0.7	1.0	2.2	0.9%
Business Sector Total	72.4	70.6	70.5	178.5	72.2%
Percent Total of Sector Sales	1.31%	1.25%	1.25%	Demand Response Program is not cumulative	
Plan Total	96.3	96.8	99.2	247.3	-
Percent of Total Sales	1.05%	1.05%	1.08%		

Table 6 presents the estimated total emissions reductions based on the projected cumulative annual energy savings at meter over the three-year period from 2012 to 2014.⁴

Table 6. Total Emissions Reductions – 2012 to 2014

Consumer Sector	NO_x (tons)	SO₂ (tons)	CO₂ (tons)	H_g (lbs.)
Efficient Products	287	189	315,876	9.2
Home Retrofit	27	18	30,006	0.9
Appliance Recycling	57	37	62,376	1.8
Behavior Change	37	25	41,262	1.2
New Home	4	2	4,163	0.1
e ³ smart SM	18	12	19,763	0.6
Community Assistance	27	18	29,371	0.9
Consumer Sector Total	457	301	502,816	14.6
Business Sector	NO_x (tons)	SO₂ (tons)	CO₂ (tons)	H_g (lbs.)
Prescriptive	519	342	571,079	16.6
Custom	168	110	184,484	5.4
New Construction	24	16	26,714	0.8
Express	25	17	28,017	0.8
Self Direct	49	32	53,428	1.6
Demand Response	-	-	-	-
Retro-commissioning	13	9	14,701	0.4
Continuous Improvement	36	24	40,071	1.2
Energy Efficiency Auction	36	24	39,893	1.2
Data Center	15	10	15,986	0.5
Business Sector Total	885	583	974,372	28.3
PLAN TOTAL	1,341	884	1,477,189	42.9

⁴ Emissions factors from AEP-East Zone.

E.6 EE/PDRs Investment and Potential Job Creation

The estimated investment for these programs is approximately \$85.1 million in 2012, \$91.5 million in 2013, and \$97.5 million in 2014, for a total \$274.1 million, as shown in Table 7.

Table 7. Estimated Annual Total Investments by Program (million \$)

Consumer Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total
Efficient Products	\$11.9	\$13.1	\$11.9	\$36.9	13.5%
Home Retrofit	\$6.9	\$5.7	\$7.2	\$19.8	7.2%
Appliance Recycling	\$2.8	\$3.3	\$4.4	\$10.4	3.8%
Behavior Change	\$1.7	\$2.0	\$2.4	\$6.1	2.2%
New Home	\$1.0	\$1.0	\$1.0	\$3.0	1.1%
e ³ smart SM	\$1.1	\$1.1	\$1.1	\$3.2	1.2%
Community Assistance	\$9.8	\$10.9	\$10.7	\$31.4	11.5%
Consumer Sector Total	\$35.1	\$37.1	\$38.6	\$110.8	40.4%
Business Sector	2012	2013	2014	2012-2014 Total (cumulative)	Percent of Plan Total
Prescriptive	\$18.6	\$19.7	\$20.1	\$58.4	21.3%
Custom	\$8.7	\$8.9	\$8.7	\$26.4	9.6%
New Construction	\$1.0	\$1.0	\$1.0	\$3.0	1.1%
Express	\$3.4	\$3.6	\$3.8	\$10.8	3.9%
Self Direct	\$3.0	\$3.0	\$3.0	\$9.0	3.3%
Demand Response	\$0.5	\$0.6	\$1.7	\$2.8	1.0%
Retro-commissioning	\$0.8	\$1.2	\$1.6	\$3.5	1.3%
Continuous Improvement	\$2.0	\$3.0	\$4.0	\$9.0	3.3%
Energy Efficiency Auction	\$2.1	\$3.0	\$4.1	\$9.2	3.4%
Data Center	\$0.9	\$1.4	\$1.9	\$4.2	1.5%
Business Sector Total	\$40.9	\$45.4	\$49.9	\$136.3	49.7%
Other Costs	2012	2013	2014	Total	Percent of Plan Total
Research and Development	\$2.5	\$2.5	\$2.5	\$7.5	2.7%
Education and Training	\$0.6	\$0.7	\$0.7	\$2.0	0.7%
Targeted Advertising	\$4.5	\$4.3	\$4.3	\$13.0	4.7%
Business Behavior Change	\$1.0	\$1.0	\$1.0	\$3.0	1.1%
Codes and Standards	\$0.5	\$0.5	\$0.5	\$1.5	0.5%
Other Costs Total	\$9.1	\$8.9	\$9.0	\$27.0	9.8%
PLAN TOTAL	\$85.1	\$91.5	\$97.5	\$274.1	100.0%

To firm up cost estimates and make any necessary budget and schedule changes, AEP Ohio may re-negotiate existing contracts for ongoing programs or issue Requests

for Proposals (RFPs) for implementation contractors to bid on the work, and require them to submit detailed budgets along with estimated savings and implementation schedules. All new programs will be competitively bid through an RFP process. The cost for incremental internal management and third party evaluation, measurement and verification activities, and future plan development is included in the cost of the Plan. It is anticipated that these costs will not exceed ten percent of the total costs for the Plan.

Potential Job Creation

To capture the full economic impacts of the investments in energy efficiency, three separate effects (direct, indirect, and induced) must be examined for each change in expenditure. The sum of these three effects yields the total effect resulting from a single expenditure.

- The **direct effect** refers to the on-site or immediate effects produced by expenditures. In the case of installing energy efficiency upgrades in a home or business, the direct effect is the on-site expenditures and jobs of the construction or trade contractors hired to carry out the work.
- The **indirect effect** refers to the increase in economic activity that occurs when a contractor or vendor receives payment for goods or services delivered and is able to pay others who support their businesses. This includes the equipment manufacturer or wholesaler who provided the new technology. It also includes the bank that provides financing to the contractor, the vendor's accountant, and the building owner where the contractor maintains its local offices.
- The **induced effect** derives from the change in spending that energy efficiency investments enable. Businesses and households are able to meet their energy, heating, cooling, and lighting needs at a lower total cost, due to efficiency investments. This lower cost of doing business and operating households makes greater wealth available for businesses and families to spend or invest in other goods and services such as food, clothing, entertainment, or marketing (in the case of businesses).

Table 8 shows the total number of potential jobs—direct, indirect, and induced—that are estimated would be created from investing \$274.1 million in electric energy efficiency and peak demand reduction in AEP Ohio customer homes and businesses in 2012 through 2014. AEP Ohio estimates the number of jobs that will be created at approximately 2,000 direct jobs, 1,500 indirect jobs, and 1,000 induced jobs, for a total of approximately 4,500 total jobs created during the three-year period.⁵ On average,

⁵ Job creation estimates based on data from Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy, pages 9 and 27, Political Economy Research Institute, University of Massachusetts at Amherst, http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf

based on this analysis, one job potentially will be created for approximately \$61,000 in spending.

Table 8. Number of Jobs Created (2012 through 2014)

2012 to 2014	Direct	Indirect	Induced	Total
Jobs Created	2,000	1,500	1,000	4,500

E.7 Benefit-Cost Analysis, Net Benefits and Bill Impacts

Energy efficiency measures were evaluated with respect to each of the four standard benefit-cost tests:⁶

- **Participant Test (PCT):** 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 EE/PDR 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 EE/PDR 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 EE/PDR program administrative costs.

In line with standard industry practice and PUCO rule, AEP Ohio used the TRC test to guide which EE/PDR programs to include in the Plan. Most measures passed the TRC test. The Plan of EE/PDR programs in the Plan is cost effective by industry standards with a total resource cost test ratio of 1.7, indicating that every dollar AEP Ohio invests in EE/PDR will yield over twice the benefits. The Business sector passes the RIM Test (is ≥ 1.0); thus the Plan is projected to reduce rates overall for Business Sector customers. The Residential sector does not pass the RIM Test.

⁶ 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>.

Table 9 presents the overall benefit cost ratios for the consumer sector, the business sector, and the overall Plan including all costs from cross-sector and other activities.

Table 9. Cost-effectiveness Ratios – 2012 to 2014

Consumer Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Efficient Products	2.3	4.0	8.4	0.3
Home Retrofit	1.4	0.9	21.2	0.2
Appliance Recycling	3.7	1.7	NA	0.3
Behavior Change	1.2	1.2	NA	0.3
New Home	1.0	1.1	5.0	0.2
e ³ smart SM	1.9	2.6	NA	0.4
Community Assistance	0.5	0.5	NA	0.2
Consumer Sector Total	1.7	2.0	9.7	0.3
Business Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Prescriptive	2.0	5.2	2.9	0.7
Custom	1.4	4.5	2.1	0.7
New Construction	12.8	31.6	7.0	2.8
Express	1.2	1.3	4.3	0.5
Self Direct	2.1	4.1	4.6	0.7
Demand Response	23.8	6.0	NA	6.0
Retro-commissioning	1.5	2.1	7.2	0.6
Continuous Improvement	2.3	4.0	5.6	0.8
Energy Efficiency Auction	2.3	3.9	5.6	0.8
Data Center	1.4	2.0	5.3	0.6
Business Sector Total	1.9	4.6	3.6	0.8
	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
PLAN TOTAL	1.7	2.9	4.2	0.5

Projected Net Benefits

The formulas used to determine the net benefits for each benefit-cost test are provided in Table 10. All tests are evaluated by calculating the net present values over the lifetimes of the measures covered by the programs. The total net benefits for each benefit-cost test for the 2012-2014 EE/PDR Plan are calculated by subtracting the value(s) in the denominator of each formula from the value(s) in the numerator. For example, subtracting both Administrative Costs (B) and Incentive Costs (C) from the Avoided Costs (A) results in the the Utility Cost Test (UCT) net benefits.

Table 11 presents the present value costs for the 2012-2014 EE/PDR Plan. The Avoided Costs (A) and Bill Reductions (E) result from energy savings and are valued as benefits. The Administrative Costs (B), Incentive Costs (C), and Technology Costs (D) are valued as costs.

Table 10. Benefit-Cost Test Formulas

Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)	Total Resource Cost Test (TRC)	PV = Present Value
$UCT = A / (B+C)$	$PCT = (C+E) / D$	$RIM = A / (B+C+E)$	$TRC = A / (B+D)$	

Table 11. Present Value Costs – 2012 to 2014

PV Avoided Costs (A)	PV Administrative Costs (B)	PV Incentive Costs (C)	PV Technology Costs (D)	PV Bill Reductions (E)
\$665,470,807	\$103,354,106	\$123,399,781	\$281,434,018	\$1,056,032,067

Utility Cost Test (UCT) indicates how much utility costs will decrease due to the projected EE/PDR programs. The UCT examines the EE/PDR costs and benefits from the AEP Ohio's perspective. The UCT allows AEP Ohio to evaluate EE/PDR benefits and costs on a comparable basis with supply-side investments. A positive UCT indicates the total EE/PDR costs to save energy are less than the AEP Ohio's costs to deliver the same amount of power through new supply side resources. A positive UCT shows that customer average bills will go down if EE/PDR measures are installed. The net benefits from the UCT is the reduction in revenues to AEP Ohio due to reduced energy consumption.

Participant Cost Test (PCT) examines the costs and benefits from the perspective of the customer installing the EE/PDR measures. The PCT shows how much the EE/PDR program participants are projected to save over the life of the measures installed.

Rate Impact Measure Test (RIM) indicates how much AEP Ohio's rates are projected to increase or decrease over the long term as a result of the EE/PDR measures installed. Unlike typical supply-side investments, EE/PDR programs reduce energy sales. It is also important to consider whether rates overall will increase more or less by installing EE/PDR measures than new supply side resources over the long term.

Total Resource Cost Test (TRC) shows how much more or less energy efficiency resources cost compared to new supply side electricity resources in the AEP Ohio service area. Unlike other cost tests, the TRC does not take the view of a class of stakeholders. The TRC test is essentially the “all ratepayer” test. The TRC is similar to the UCT except that the TRC considers the full cost of the measure itself rather than only the portion covered by the incentive paid by AEP Ohio.

Table 12 presents the cost test results in terms of net present value (NPV) net benefits based on the projected 2012 to 2014 EE/PDR programs. A positive value indicates cost savings, while a negative value indicates increased costs.

Table 12. Costs Tests – Net Present Value Net Benefits – 2012-2014

Consumer Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Efficient Products	\$71,958,446	\$95,538,338	\$338,665,144	-\$266,706,698
Home Retrofit	\$3,927,585	-\$2,311,032	\$62,188,158	-\$58,260,573
Appliance Recycling	\$10,791,757	\$6,046,279	\$40,042,463	-\$29,250,707
Behavior Change	\$1,194,664	\$1,194,664	\$13,089,954	-\$11,895,290
New Home	-\$149,840	\$358,077	\$9,521,689	-\$9,671,528
e ³ SMART™	\$3,250,353	\$4,102,247	\$15,679,202	-\$12,428,849
Community Assistance	-\$13,673,995	-\$14,219,377	\$39,708,919	-\$53,382,914
Consumer Sector Total	\$77,298,971	\$90,709,197	\$518,895,529	-\$441,596,558
Business Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Prescriptive	\$129,877,548	\$208,890,814	\$220,056,181	-\$90,178,633
Custom	\$31,333,203	\$79,193,539	\$71,628,788	-\$40,295,585
New Construction	\$16,347,485	\$17,166,821	\$4,908,799	\$11,438,685
Express	\$2,086,064	\$2,881,211	\$13,233,183	-\$11,147,118
Self Direct	\$12,763,566	\$18,570,417	\$21,081,521	-\$8,317,955
Demand Response	\$9,508,669	\$8,086,544	\$0	\$8,086,544
Retro-commissioning	\$1,904,880	\$2,805,216	\$5,556,647	-\$3,651,767
Continuous Improvement	\$12,508,722	\$16,577,692	\$18,561,472	-\$6,052,751
Energy Efficiency Auction	\$12,316,013	\$16,367,345	\$18,479,627	-\$6,163,613
Data Center	\$1,737,563	\$3,045,999	\$5,596,084	-\$3,858,521
Business Sector Total	\$230,383,712	\$373,585,598	\$379,102,301	-\$150,140,714
Plan Total (includes Other Costs)	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
	\$280,682,682	\$437,294,795	\$897,997,830	-\$618,737,272

Table 13 shows the projected Utility Cost Test results by program by year for 2012 to 2014.

Table 13. Utility Cost Test (UCT) – Net Present Value Net Benefits – by Year

Consumer Sector	2012	2013	2014
Efficient Products	\$32,664,714	\$33,856,465	\$29,017,159
Home Retrofit	-\$8,825,632	\$1,860,637	\$4,653,962
Appliance Recycling	\$1,638,043	\$1,541,079	\$2,867,157
Behavior Change	\$159,355	\$295,765	\$739,543
New Home	\$80,377	\$139,641	\$138,059
e ³ SMART SM	\$1,400,866	\$1,340,849	\$1,360,531
Community Assistance	-\$4,892,675	-\$4,897,205	-\$4,429,497
Consumer Sector Total	\$22,225,049	\$34,137,233	\$34,346,915
Business Sector	2012	2013	2014
Prescriptive	\$67,906,839	\$69,543,466	\$71,440,509
Custom	\$26,692,962	\$26,728,988	\$25,771,588
New Construction	\$5,428,299	\$5,710,361	\$6,028,162
Express	\$816,980	\$924,492	\$1,139,739
Self Direct	\$5,683,467	\$6,162,338	\$6,724,611
Demand Response	\$3,227,527	\$3,060,480	\$1,798,538
Retro-commissioning	\$527,638	\$903,902	\$1,373,676
Continuous Improvement	\$3,354,544	\$5,414,245	\$7,808,903
Energy Efficiency Auction	\$3,323,705	\$5,296,414	\$7,747,226
Data Center	\$589,667	\$981,143	\$1,475,189
Business Sector Total	\$117,551,628	\$124,725,829	\$131,308,141
Plan Total (includes Other Costs)	2012	2013	2014
	\$130,676,677	\$149,938,062	\$156,680,056

Projected Electric Bill Reductions

The projected reductions in electric bills for participants in each consumer and business sector program over the life of the measures installed during 2012 to 2014 is approximately \$880 million. This amount includes the Plan cost of the programs.

The next section discusses the approach to estimating EE/PDR potential, along with an overview of EE/PDR Potential results for 2012 to 2031, and then program plans are presented, followed by conclusions and recommendations.

E.8 2012 to 2031 EE/PDR Savings Potential Analysis

AEP Ohio's program Plan was developed by incorporating elements of the most successful energy efficiency and peak demand reduction programs across North America into program plans designed for the Ohio market and AEP Ohio customers in particular. AEP Ohio used a benchmarking process to review the selected programs, with a focus on successful Midwest programs to help shape the Plan.

As detailed in Figure 3 there are four major types of EE/PDR potential:

1. *Technical* potential for all technologies.
2. *Economic* potential, the amount of EE/PDR available that is cost effective.
3. *Achievable* potential, the amount of EE/PDR available under current market conditions and available investments.
4. *Program* potential, the amount of EE/PDR available given limited resources, available time and duration of the efficiency program planning period.

AEP Ohio's EE/PDR Action Plan is focused on capturing cost-effective *program potential* in its service territory while achieving SB 221 requirements for 2012 to 2014. Most energy efficiency measures that were known not to be cost-effective were pre-screened and eliminated from all potential scenarios.

Figure 3. 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

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

AEP Ohio undertook the EE/PDR potential study with the following key tasks:

- Conduct a baseline market profile study, which included conducting telephone surveys and on-site surveys with random samples of AEP Ohio's residential and non-residential customers. The telephone surveys collected information on customers' awareness of AEP Ohio programs and energy efficiency measures, as well as customers' energy efficient equipment decision making criteria. The on-site surveys conducted detailed inventories of customers' energy using equipment, as well as building shell characteristics.
- Develop baseline consumption profiles, and develop initial building simulation model specifications.
- Characterize the EE/PDR measures.
- Conduct an EE/PDR benchmarking and best practices analysis.
- Conduct benefit-cost analysis (discussed in Section E.7).
- Estimate EE/PDR potentials.
- Develop EE/PDR program plans.

A summary of each of these tasks follows.

Baseline Market Assessments

AEP Ohio conducted baseline studies of the residential and nonresidential market segments in 2011 to characterize AEP Ohio's service territory in terms of customer numbers, age and size of household and housing stock, key building characteristics, saturation of efficient technologies, and customer awareness of and decision making about efficient options. Appendix A in Plan Volume 2 includes detailed baseline survey results.

Baseline Consumption Profiles and Simulation Model Specifications

Segment-level commercial and industrial sales data delivered by AEP Ohio 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. With building characteristics from the baseline study, the models were used to estimate savings from EE/PDR measures.

The derivation of the residential electricity market profile relied on monthly consumption data and benchmark monthly profiles of end uses to derive annual electricity consumption for seasonal and non-seasonal uses. The starting point in this exercise was

the AEP Ohio system-level residential electricity consumption by month for 2007-2008. The household total electricity consumption by month was calculated from this data. There are four seasonal end uses that were tabulated (heating, cooling, hot water, and lighting) in addition to the non-seasonal end uses (includes appliances, plug loads, and other). Results of the baseline study were used for technology saturation data.

Characterizing EE/PDR Measures

Characterization of EE/PDR measures requires:

- Estimating the baseline energy consumption for each end-use (heating, cooling, cooking, hot water, etc.) or unit energy consumption (UEC).
- Estimating the incremental savings from each measure – improving from the baseline to the new technology.
- 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. A combination of approaches to characterize the EE/PDR measures was used for this study. For EE/PDR measures having impacts that do not vary with climate, data was used from several different sources, including: ongoing AEP Ohio programs, the 2011 residential and nonresidential baseline studies, the draft Ohio Statewide TRM for climate-dependent measures, and engineering estimates, as well as publicly available and well-respected sources, such as the California Database on Energy-Efficiency Resources (DEER) database. The approach adjusted the DEER energy and demand impacts for AEP Ohio's customer operating parameters as necessary based on the local weather. In addition to using data from ongoing AEP Ohio programs, or the draft Ohio Statewide TRM for climate-dependent measures, the analysis used a combination of building simulation modeling and engineering estimates specifically developed for AEP Ohio to estimate EE/PDR measure per unit savings.

For EE/PDR measure costs, in addition to using data from ongoing AEP Ohio programs or the draft Ohio Statewide TRM for climate dependent data, AEP Ohio primarily used the California DEER database, adjusted by geographic multiplier factors from industry sources, such as the RS Means Mechanical Cost Data.⁷ A variety of sources were used to establish measure lifetimes, including, ongoing AEP Ohio programs, the draft Ohio Statewide TRM, manufacturer data, typical economic depreciation assumptions, and the California DEER database. Appendix C in Plan Volume 2 provides detailed measure descriptions and characterizations.

⁷ <http://rsmeans.reedconstructiondata.com/>

EE/PDR Benchmarking and Best Practices Assessment

To ensure that the DSM potential estimates developed are reasonable and appropriate, and to identify the best practices of DSM programs, AEP Ohio conducted a benchmarking assessment on other utilities' DSM programs, in Ohio and in neighboring states, that have relatively new DSM requirements and Plans and available data about them. To identify common best practices of top performers, the analysis compared detailed program results by customer sector of those utilities identified as achieving high levels of DSM savings for below-median costs.

Table 14 shows the 2009 and 2010 median EE/PDR benchmarking data for AEP Ohio and nine other Midwest utilities, including overall spending, savings, costs, and energy costs. Appendix B in Plan Volume 2 provides more benchmarking results.

Table 14. 2009 and 2010 EE/PDR Benchmarking Data

	Spending as Percent of Revenue	Energy Savings as Percent of Sales	Peak Demand Savings as Percent of Peak Demand	Retail Cost of Energy \$/kWh	Cost of First Year Savings	
					\$/kWh	\$/kW
All Region Median 2009	0.4%	0.4%	0.1%	\$0.09	\$0.11	\$1,081
AEP Ohio 2009	0.4%	0.6%	0.4%	\$0.07	\$0.05	\$412
All Region Median 2010	0.8%	0.7%	0.5%	\$0.09	\$0.11	\$478
AEP Ohio 2010	0.8%	0.7%	0.5%	\$0.08	\$0.09	\$709

(1) Note: Cost of First Year Savings is not comparable to a supply-side investment and is only used to compare programs and Plans at a high level for reasonableness of cost.

For 2009, the utilities with the largest relative energy savings and below-median costs achieved energy savings at about 0.6 percent of annual sales. The utilities with the largest relative peak demand savings and below-median costs saved about 0.4 percent of peak demand. AEP Ohio saved more than the median amount of savings from the utilities' benchmarked in 2009, and AEP Ohio's program costs were lower than the median program costs.

For 2010, the utilities with the largest relative energy savings and below-median costs achieved energy savings at about 0.9 percent of annual sales. The utilities with the largest peak demand savings and below-median costs saved about 0.9 percent of peak demand, over twice that for 2009. AEP Ohio saved about the median amount of savings of the utilities benchmarked in 2010.

EE/PDR Program Potentials

AEP Ohio developed estimates of EE/PDR measure potentials in terms of technical, economic, and “achievable” potential (the program results that are realistic for AEP Ohio to achieve through cost-effective EE/PDR 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, and inform which measures were to be included or excluded.

Achievable EE/PDR market potential estimates the amount of EE/PDR potential that could be captured by realistic EE/PDR programs that include cost effective EE/PDR measures over the forecast period covered by this EE/PDR potential analysis. Achievable EE/PDR potential can vary with EE/PDR program parameters, such as the magnitude of rebates or incentives offered to customers for installing EE/PDR measures and, thus, many different scenarios can be modeled.

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 are based on AEP Ohio’s and other utilities’ actual experiences with these types of programs. AEP Ohio developed two achievable potential estimates:

1. A base case or expected EE/PDR potential estimates. These estimates assume that adequate funding is available to achieve the EE/PDR potentials and that AEP Ohio is able to achieve “best practice” EE/PDR program performance over the short term, from 2012 to 2014.
2. A high case estimate based on the experience of the best of the best utilities’ EE/PDR program results, to meet the SB 221 requirements over the long term, through 2031.

The Plan’s Business Sector will achieve greater energy and demand savings than the base case scenario. As a result, the overall Plan is projected to achieve energy and demand savings above the Base Case.

EE/PDR Potential Results

The cumulative annual EE/PDR potential savings (Base Case Scenario Market Potential) in 2031 is estimated to be approximately 9.6 thousand GWh at meter, about 20 percent of forecast baseline sales, and approximately 1,800 MW at meter, about 18 percent of baseline peak summer demand, as shown in Table 15. Table 15 also presents the projected savings in 2031 for the technical, economic, and high market potential scenarios.

These results assume a net-to-gross impact ratio of 1.0 whereby free ridership is assumed for this analysis to be offset by spillover impacts. The Base Case market potential meets the SB 221 savings targets over the short term, from 2012 to 2014. The high case market potential meets the SB 221 cumulative savings targets over the long term, through 2031. The Base Case market potential includes incentives at 50 percent of incremental measure costs in most instances for residential measures, and mostly 25 percent for nonresidential measures. The High Case market potential includes incentives at 75 percent of incremental measure costs in most instances for residential measures, and 50 percent for nonresidential measures. Appendix A in Plan Volume 2 provides detailed EE/PDR potential study results.

Table 15. Projected Cumulative Annual Savings at Meter and Costs – 2031

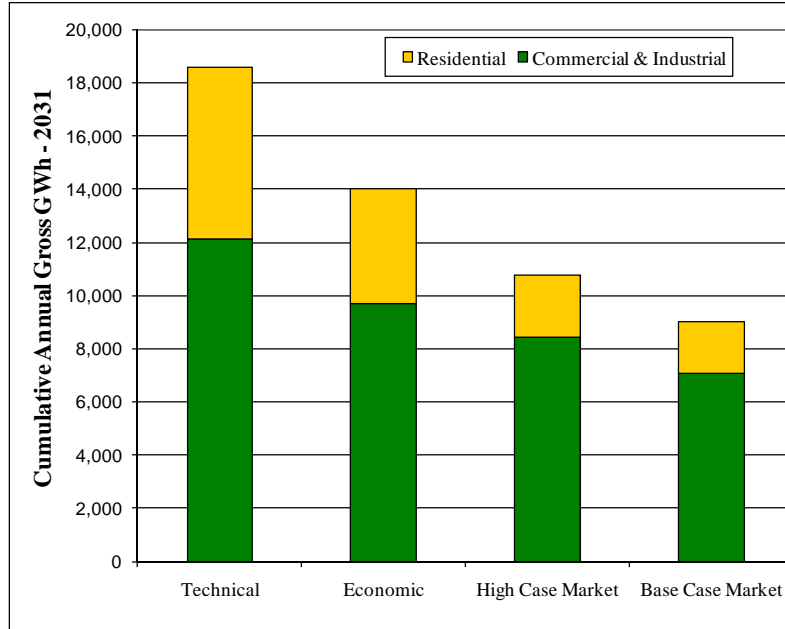
Potential Scenario	Cumulative Annual Gross Energy Savings (1) at Meter (2031)		Cumulative Annual Gross Summer Peak Demand Savings (1) at Meter (2031)		Total Cost (Energy Efficiency Only) (2)
Sector	GWh	Percent of 2031 Forecast Sales	MW	Percent of 2031 Forecast Sales	20 Year Cost (2012 to 2031) million 2012\$
Residential					
Technical	6,484	42%	1,307	33%	-
Economic	4,301	28%	835	21%	-
High Case	2,325	15%	446	11%	\$5,288
Base Case	1,946	13%	407	10%	\$1,272
Commercial & Industrial					
Technical	12,131	37%	2,078	38%	-
Economic	9,740	30%	1,737	31%	-
High Case	8,454	26%	1,517	27%	\$2,364
Base Case	7,116	22%	1,296	23%	\$1,229
Total					
Technical	18,615	38%	3,385	33%	-
Economic	14,041	29%	2,571	28%	-
High Case	10,779	22%	1,963	21%	\$7,652
Base Case	9,062	19%	1,703	18%	\$2,501

(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency. AEP Ohio also will conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables and Plan cost-benefit analysis.

(2) Costs are not included for Cross-Sector or Other Activities.

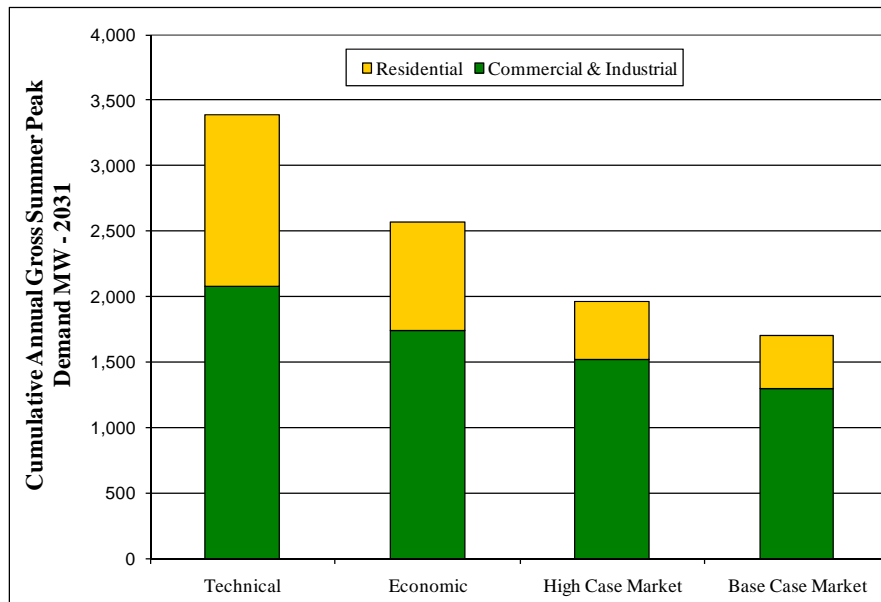
Figure 4 and Figure 5 show the cumulative annual energy and summer peak demand savings in 2031 for each of the four potential analysis scenarios.

Figure 4. Cumulative Annual GWh Energy Savings in 2031



(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency.

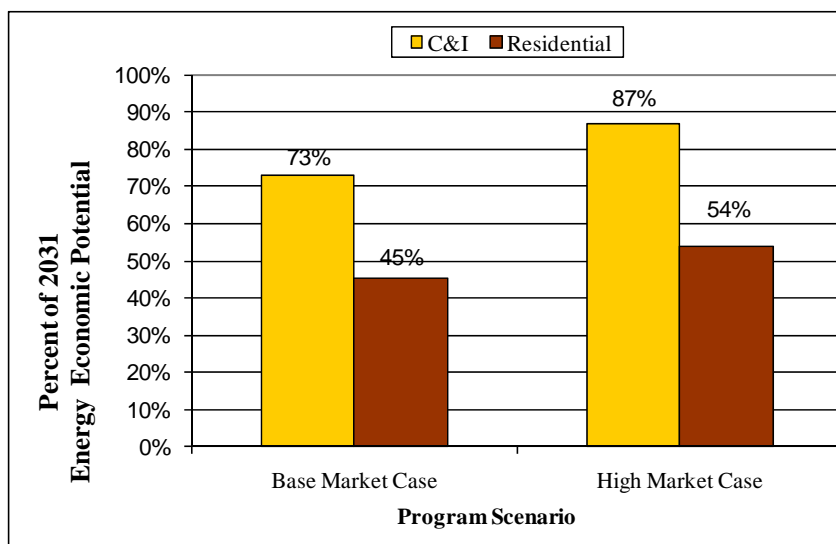
Figure 5. Cumulative Annual Summer Peak MW Demand Savings in 2031



(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency.

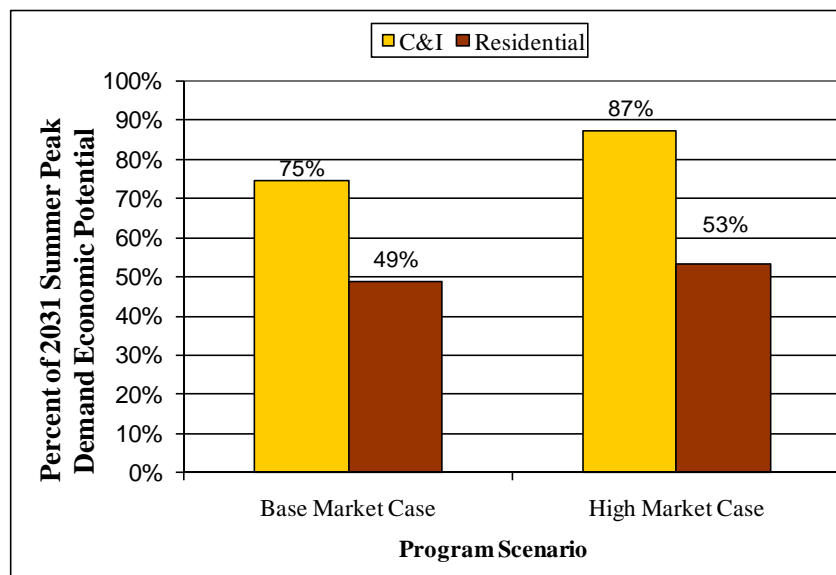
Figure 6 and Figure 7 show the cumulative Market Potential⁸ as a percent of the Economic Potential for EE/PDR.

Figure 6. Market Potential Annual Energy Savings at Meter as Percent of Economic Potential in 2031



(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency.

Figure 7. Peak Demand Savings at Meter as Percent of Economic Potential in 2031



(1) Savings are not projected for Research and Development, Business Behavior Change, Codes and Standards Support, Transmission and Distribution (T&D) System Efficiency Improvements, gridSMART Demonstration Project EE/PDR Savings, or Customer Power System Efficiency.

⁸ Defined here as the potential achievable in real-world market risk situations.

E.9 Overview of Program Plans

The intent of the Plan presented here is to provide a sense of scope and scale and to convey the general schedule and resources needed to increase participation in the various markets in which AEP Ohio will operate the programs. The plans for newly-proposed programs developed for this study are based primarily on best-practice programs and the experience gained by AEP Ohio in the operation of its 2009-2011 Plan, with the strategic concepts outlined. These program plans are proposed as guidelines for more detailed program planning. An update is presented for ongoing programs, along with any program modifications proposed, that were approved in the 2009-2011 EE/PDR Action Plan.

Overall, the Plan covers a broad range of demographic, business, facility and end-use markets. AEP Ohio's Plan can be divided into consumer, business and cross-sector, with utility administrative functions providing support across all program areas. AEP Ohio will maintain as part of its functions the education and training, advertising, and research and development budgets. These efforts will leverage existing AEP corporate resources to maximize the impact of these outreach and education efforts.

Consumer Sector

AEP Ohio currently offers seven consumer (residential) sector programs:

- **Efficient Products** – This program produces long-term electric savings by increasing the market share of high-efficiency lighting and select ENERGY STAR[®] qualified appliances through price markdowns, coupons and mail-in rebates.
- **Appliance Recycling** – This program permanently removes operable second refrigerators and freezers and older operating room air conditions and primary refrigerators and freezers that have been replaced by recycling them in an environmentally safe manner.
- **In-Home Audit** – This program provides custom, prioritized recommendations on appropriate weatherization measures and the installation of high-efficiency lighting, appliances, HVAC and other equipment based on an in-home audit, in-home assessment or online energy survey of a customer's single family or multifamily home. Free energy saving items such as CFL light bulbs, electric water heater measures (e.g., low-flow shower head, faucet aerators, pipe wrap), and programmable thermostats are installed or provided to participating customers. Joint program delivery with Columbia Gas is planned.
- **Behavior Modification, renamed Behavior Change** – This program provides tips that are relevant to a customer's home and provides an estimate on how much electricity and money they may save by implementing suggested energy efficiency measures and changing energy usage behaviors.

- **Residential New Construction, renamed New Home** – This program produces long-term electric energy savings by affecting the construction of single family homes, duplexes and multifamily housing to meet select ENERGY STAR® efficiency standards on insulation, HVAC, water heating, appliances, lighting, windows, doors and other quality construction measures.
- **Conservation Kits, renamed e³smartSM school** program – This energy efficiency education program is for students of schools served by AEP Ohio and the curriculum is designed to meet national and state science standards for grades 5-9. Students take home energy efficiency measures and install them as part of the learning experience.
- **Low Income, renamed Community Assistance Program or CAP** – This program generates energy savings for residential low-income customers through the installation of a wide range of weatherization upgrades and base load electric measures. Qualified customers must be at or below 200 percent of the federal poverty level and be approved for an energy assistance program such as Home Energy Assistance Program (HEAP), Percentage of Income Payment Plan (PIPP) or Home Weatherization Assistance Program (HWAP).

Business Sector

AEP Ohio currently offers five business (nonresidential) sector programs:

- **Prescriptive** – This program is based on a menu of standardized incentives for high efficiency lighting, heating, ventilation, and air conditioning (HVAC), motors, drives and refrigeration.
- **Custom** – This program provides incentives for qualifying efficiency improvements not included in the Prescriptive Program or other AEP Ohio Programs.
- **New Construction** – This program provides incentives for new construction and major renovation to exceed current building energy code requirements.
- **Self Direct** – This program is available to capture energy savings from large mercantile customers with the capability to administer internal energy management efforts of their own. It allows submittal of energy saving projects from the last three years.
- **Demand Response** – This program is used to supplement the peak demand reductions achieved from energy efficiency programs in order to ensure the peak demand reduction benchmark requirements of SB 221 are met.

AEP Ohio proposes five new business sector programs for 2012 through 2014:

- **Express** – This program provides a streamlined, one-stop, turn-key service for small business customers and is delivered through registered local contractors.

- **Retro-commissioning** – This program for medium and large customers provides assessments to identify and implement low-cost, operational adjustments that improve the efficiency of existing buildings' operating systems by optimizing the systems to meet the building's requirements, with a focus on building controls and HVAC systems.
- **Continuous Improvement** – This program is for large customers that consume significant amounts of energy. It is designed to engage corporate management to create a sustainable culture and planned actions to reduce energy use long term.
- **Energy Efficiency Auction** – This program is for customers in the capital planning process considering large potential energy efficiency projects, or for aggregators of customer energy efficiency projects.
- **Data Center** – This program provides for energy savings opportunities for new and existing data centers of all sizes from data closets to enterprise class centers.

Cross-Sector Activities and Other Programs

AEP Ohio currently offers three cross-sector activities and proposes to continue and expand these efforts:

- **Education and Training** – This program will coordinate AEP Ohio's efforts to create customer, marketer, contractor and supplier awareness for the programs and the proper installation of measures, enhance demand and educate customers on energy efficiency.
- **Targeted Advertising** – This program is designed to build customer awareness of energy efficiency in support of AEP Ohio EE/PDR programs and also to encourage market transformation in support of AEP Ohio's commitment and key goals of this Plan.
- **Research and Development (formerly Pilot Program)** – The program objective is to identify and develop new energy efficient technologies, programs and marketing approaches to capture cost effective energy savings.

AEP Ohio proposes five new cross-sector programs or other activities for 2012 to 2014:

- **Business Behavior Change** – This pilot program reviews Business customer behavior change program opportunities, with an emphasis on customers with energy management systems that can directly measure sustainable improvements.
- **Code and Standards Support** – This pilot program provides education and training to improve compliance with current energy efficiency codes and

standards measures the effectiveness of those efforts for reporting energy savings.

- **T&D System Efficiency Improvements** – This activity defines and provides energy savings from AEP Ohio T&D projects that improve efficiency.
- **gridSMART Demonstration Project EE/PDR Savings** – This activity provides energy savings achieved from this project.
- **Customer Power System Efficiency** – This program provides customers with specific technology measures that can be implemented to improve power quality and to produce energy and demand savings within the customers' facilities or the AEP Ohio T&D System.

E.10 Plan Implementation

AEP Ohio plans to continue implementing the proposed Plan through a combination of in-house utility staff and competitively selected third-party implementation contractors. For newly-proposed programs, AEP Ohio may issue RFPs to qualified firms for the program delivery. Implementation contractors are eligible to respond to any or all of the RFPs. From start to finish, AEP Ohio anticipates the process of issuing RFPs, evaluating responses and negotiating contracts along with associated program start-up time will result in 2012 launch dates for most newly-proposed programs. Remaining programs needing longer preparation times will begin on an extended schedule. For existing programs, AEP Ohio may issue RFPs or re-negotiate contracts with existing implementation contractors.

E.11 Evaluation, Measurement and Verification

Program evaluation, measurement, and verification (EM&V) activities are central to the success of AEP Ohio's Plan and will be used to verify program savings impacts and monitor program performance. These activities serve as a way to determine the actual program level savings being delivered and to maximize energy efficiency and peak demand reduction investments.

Effective EM&V ensures that expected results are measurable, achieved results are robust and defensible, program delivery is effective in maximizing participation, and the overall Plan is cost-effective.

Framework for Evaluation

Appropriate EM&V requires that a framework be established that encompasses both planned EM&V efforts and data collected as part of program implementation. This section provides an overview of the monitoring, verification, and evaluation efforts recommended to support appropriate EM&V. The basic requirements and approaches

for planning program-specific evaluations, including the allocation of funds across evaluation efforts, also are discussed in this section. Importantly, EM&V efforts evolve over time and change as programs move from initial roll-out with few participants to full-scale implementation.

All significant evaluation activities will be conducted by third-party evaluation consultants. Impact evaluations are most often performed by organizations independent of those responsible for designing and implementing programs to ensure objectivity. Process evaluations and market effects studies typically also are prepared by independent evaluators, but process evaluations in particular are used less to verify performance than to help improve performance and, as such, require active participation by the program administrator/implementer.

Approach to Evaluation

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 very cost-effective method that has been very successful for other program administrators (such as New York State Energy Research and Development Authority [NYSERDA]).

The timing of EM&V activities and reporting can have a significant effect on the accuracy and usefulness of findings. Data collection done months or years after a program intervention can be weakened by fading memories, lost data, and confounding events that have happened in the intervening time. EM&V reports that come well after program intervention can arrive too late to provide input at key program implementation stages.

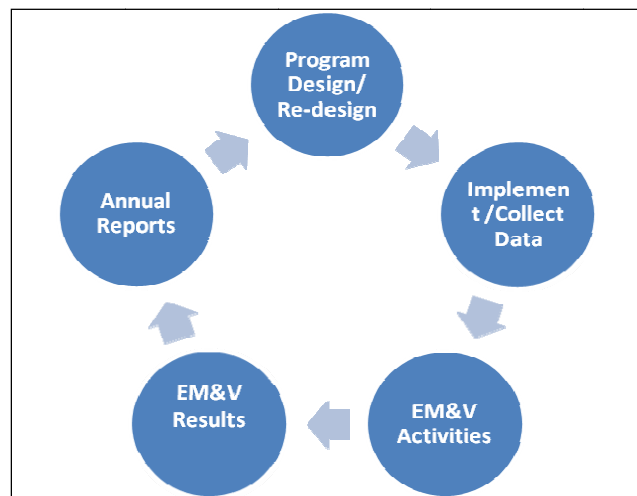
EM&V plans are designed to mitigate these problems. The process by which this is done is to integrate select data collection within the program implementation process and to provide near real-time feedback on key indicators of program progress. EM&V processes that take an “integrated data collection” (IDC) approach to planning seek out opportunities in the program implementation process where evaluation data can be collected efficiently, cost-effectively, accurately, and produce timely results. One example is program application forms, where programs can collect comparable data in standard formats across programs. Of course, this approach will be highly dependent of the program design and the points where the program interacts with the customer or trade ally.

The IDC approach requires the EM&V and implementation staff to work closely together to develop a protocol for collecting data as part of the standard program implementation practices and customer correspondence associated with the program. It also is important for the program implementation staff to see successful M&V as part of their responsibility; i.e., the program will get credit for the savings that can be verified

and program implementers can have a dramatic influence on how accurately this in-field verification can be accomplished.

The IDC protocol garners participant feedback in near real-time to support process, market, and impact analyses. Examples include exit surveys with training participants designed by evaluation staff, but administered by program implementation staff: evaluation inputs on program application forms so key baseline data is collected before existing equipment is replaced, and regular transfer of program data to evaluators, so follow-up surveys can be implemented soon after program participation. Figure 8 below shows the program evaluation cycle.

Figure 8. Steps of the EM&V Process



Approximately three to five percent of overall Plan program costs will be allocated to the following activities, further described in the following sections:

- EM&V-related activities.
- Project savings verification and due diligence.
- Independent program evaluations.
- Independent assessment of annual program impacts.
- Internal quality assurance and control.
- Coordination of evaluation activities with other players, such as the PUCO statewide evaluator.

Independent Program Evaluations

Descriptions of proposed evaluations for each program are included in the program plans. The key components of the process and impact evaluations include:

- Evaluations conducted by an independent, EE/PDR evaluation consultant.
- Verification, by an appropriate sample, that efficiency measures are installed as expected.
- In-field measure performance measurement and data collection.
- Energy and demand savings analysis to compute the results that are being achieved.
- Cost-effectiveness analysis by program and overall EE/PDR Plan.
- Process evaluation to indicate how well programs are working to achieve objectives.
- Identification of important opportunities for improvement.

Assessment of Annual Impacts

AEP Ohio's EM&V contractor will prepare an annual report of EE/PDR program results, which will incorporate findings from evaluation activities completed that year, changes to programs, and new programs implemented, as well as energy savings, costs and cost-effectiveness results by program and Plan. It is anticipated that the EM&V contractor's work, as well as participation in the process by the implementation contractor, will identify numerous areas where improvements and refinements to the AEP Ohio deemed measure database would be useful. As required, AEP Ohio will submit program evaluations to the PUCO statewide evaluator for its review.

In addition to the procedures outlined above for verifying savings from AEP Ohio's proposed Plan, AEP Ohio will implement appropriate internal controls to assure the quality of program design and implementation and establish a consistent and integrated tracking and reporting system for all programs in the Plan. AEP Ohio plans to produce monthly reports on all customer interactions, including customers recruited, incentive applications, incentives processed, and installations verified, and will establish procedures for ongoing verification.

AEP Ohio will require implementation contractors or staff to routinely contact or visit a sample of participating customers to assess the quality of program delivery and the installation of measures for which incentives were claimed. AEP Ohio intends to also track on an on-going basis incentive fulfillment time, technical services delivery times (how long between customer request and audit completion for example), incentive documentation, and customer complaints among other metrics of program performance.

PJM Evaluation Requirements

AEP Ohio's EM&V plans will be developed to ensure that the evaluations to be conducted are done in a manner that enables AEP Ohio the ability to nominate achieved and verified energy efficiency and peak demand reduction values with a level of statistical confidence and precision that complies with PJM's Manual 18B Energy Efficiency Measurement & Verification.⁹

E.12 Plan Risk

In the current difficult economic environment, AEP Ohio'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, may continue to be challenging. AEP Ohio recognizes this challenge and has striven to develop a balanced Plan that provides opportunities for participation at multiple levels. By proposing a multi-faceted and broad Plan of programs, AEP Ohio will be able to capitalize on those sectors of the market willing to invest in energy efficiency, regardless of the challenging economic landscape. This Plan is designed to allow AEP Ohio to meet overall legislative efficiency goals.

AEP Ohio plans to use the following strategies to minimize the risks associated with its portfolio of EE/PDR programs in this Plan:

- 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 EE/PDR 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.

⁹ See <http://pjm.com/~media/documents/manuals/m18b.ashx>. PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.

- Monitoring and responding to rapidly dropping equipment prices quickly.
- Setting appropriate qualifying efficiency levels.
- Setting appropriate incentive levels.
- Rolling out targeted marketing to contractors focusing on what is in it for them and how they participate.
- Training account managers on program rules.
- 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.
- Expanding research and development to assist in mid stream adjustments to current programs as needed and developing new programs for future implementation.

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 EE/PDR improvements and load management. Problems commonly encountered that affect delivery may occur and dampen program performance 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.

E.13 Conclusions and Recommendations

The EE/PDR potential (Base Case Scenario Market Potential) identified in this study represents energy reductions of approximately 13 percent for AEP Ohio residential customers and 22 percent for commercial and industrial customers below forecasted levels and known enacted energy codes and standards by 2031, or approximately 1.0 percent per year. This magnitude of savings has been achieved by best practice program portfolios in the Midwest, Northeast and Western U.S. Summer peak demand and annual energy reductions of the magnitudes found for the Base Market Potentials case are being achieved by a variety of utilities. Meeting the SB 221 targets over the long term, through 2031, will require energy reductions on the order projected in the High Case Scenario Market Potential, which have been achieved by few jurisdictions to date. Accordingly, the proposed 2012 to 2014 EE/PDR includes energy savings goals above the base case scenario for the business sector.

Over time, AEP Ohio will need to increase EE/PDR activities beyond the Base Case Scenario Market Potential for 2012 to 2014 to achieve the projected long-term savings in the High Case Scenario Market Potential. Based on the results from the initial three-year 2009-2011 period, and considering additional program and measure offerings, in 2014, AEP Ohio will propose EE/PDR efforts beyond the three-year 2012 to 2014 period, to meet the SB 221 savings goals for 2015 to 2017.

The EE/PDR benchmarking analysis results presented in this report give AEP Ohio management confidence that a variety of utilities in the region and throughout the country are achieving large-scale results from their EE/PDR programs.

Utilities that choose to invest significantly in EE/PDR programs often make significant periodic investments to develop and update secondary best-practice and primary market research data to aid their EE/PDR program planning. AEP Ohio conducted market assessment baseline studies of residential and nonresidential customer sectors in 2011 that included significant on-site customer data collection. Both AEP Ohio's 2012 to 2014 EE/PDR Action Plan and the 2012 to 2031 potential study included significant customer data from the baseline studies.

Recommendations to consider include the following:

- Move the results into operational planning with a focus on integrating newly proposed programs seamlessly into the ongoing Plan.
- Utilize an outsourcing strategy selectively to jump-start key additions to the ongoing Plan.

1 INTRODUCTION

AEP Ohio, comprised of Columbus Southern Power (CSP) and Ohio Power Company (OPC), and based in Columbus, is Ohio's second largest provider of electric service with a mix of 1.5 million residential, commercial and diversified industrial customers.¹⁰ Pursuant to the requirements in 2008 Senate Bill (SB) 221 and Ohio Revised Code 4901:1-39, AEP Ohio submits this Plan for calendar years 2012 to 2014 for approval by the Public Utility Commission of Ohio (PUCO).

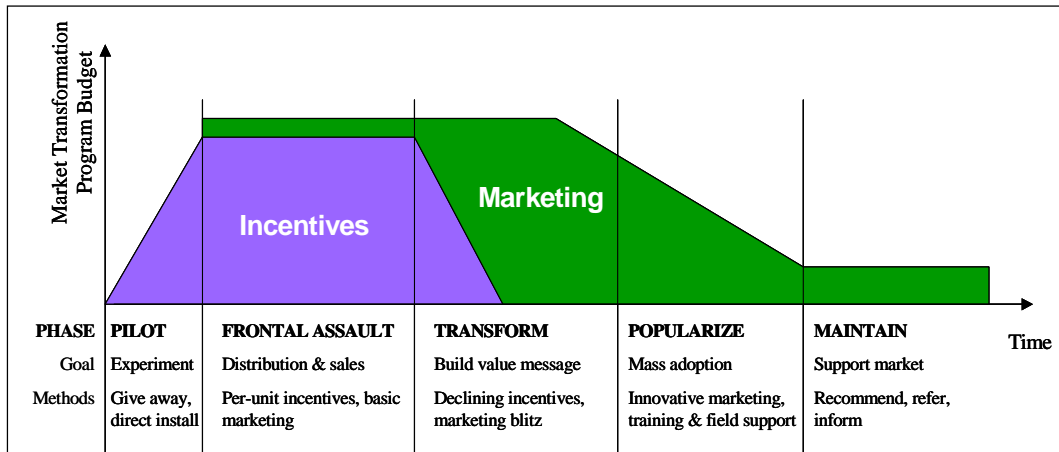
The following Plan presents a detailed overview of the proposed electric efficiency programs targeted at the consumer, business sectors, and associated implementation costs, savings, and benefit-cost results. This plan presents detailed information on the approach, EE/PDR measures, and proposed incentive levels, though AEP Ohio anticipates that, upon implementation, portions of this plan will need to be adjusted to reflect better information or changing market conditions. AEP Ohio will update the PUCO accordingly regarding any substantive revisions to the Plan.

Together with stakeholders and industry expert Navigant Consulting, Inc. (Navigant), AEP Ohio has designed a comprehensive EE/PDR Plan 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 ratepayer dollars invested. Proper coordination between the programs is essential to maximizing this leverage.

As detailed in Figure 9, AEP Ohio anticipates that over time investment in energy efficiency measures will follow a predictable path of market transformation that has been experienced in other jurisdictions. With sustained levels of investment, promotion of efficient measures will in the early years focus on immediate up-front incentives to stimulate the marketplace. Overtime, funds will 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 will be transferred to new program areas and new technologies, and the process will repeat. Each series of the market transformation process will result in greater and more efficient opportunities for residential and business customers.

¹⁰ Currently, a merger of the two territories is pending.

Figure 9. 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 AEP Ohio, one growing increasingly important as fuel and commodity prices become more volatile and greenhouse gas regulation becomes more likely. Estimates of DSM or (EE/PDR) 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 EE/PDR potential in AEP Ohio's service territory from 2012 to 2031.

1.1 AEP Ohio Overview

As described on AEP Ohio's web site, the Company is a significant utility in the Midwest. With about 1.5 million customers and over 11,000 megawatts of generation, AEP Ohio has a strong market presence. Figure 10 presents AEP Ohio's service territory, which spans a large geographic area in Ohio, as well as a small portion of West Virginia¹¹. AEP Ohio provides power to more than 920 communities located in 61 of Ohio's 88 counties.

Figure 10. AEP Ohio's Service Territories



¹¹ AEP Ohio's West Virginia service territory is not included in this report.

Table 16 outlines key statistics for AEP Ohio.

Table 16. AEP Ohio Key Statistics¹²

AEP Ohio's Business Profile 2010 Statistics	
Operating Information	
Total Customers	1,499,693
Residential	1,308,552
Commercial	177,408
Industrial	10,751
Other	2,982
2010 electrical sales in megawatt-hours	49,738,867
Size of service area (asset)	10,373 square miles
Communities served	1,126
Net plant in service	\$9.8 billion
Size of distribution system	47,450 miles
Size of transmission system	9,248 circuit miles
Total number of AEP Ohio employees	2,992
Financial Information	
2010 Operating Revenue	\$5.6 billion
2010 Net Income	\$567.2 million
2010 Ohio Taxes Paid	\$164.4 million
2010 Local Taxes Paid	\$182.4 million
Top 10 Customers (by revenue)	
Ormet Primary Aluminum Corporation	Marathon Petroleum Company, LLC
The Ohio State University	The Timken Company
Eramet Marietta, Inc.	Republic Engineered Products, LLC
Consol Energy	Premcor Refining Group, Inc.
PPG Industries	Globe Metallurgical, Inc.

¹² <https://www.aepohio.com/global/utilities/lib/docs/factsheets/AEPOhioOpcoFactSheets6-2011.pdf>

1.2 EE/PDR Study Goals and Approach

The overall goals of the EE/PDR potential study are to:

- Assess the technical, economic, and achievable potential for the residential, commercial and industrial sectors.
- Develop high-level EE/PDR program plans.

AEP Ohio undertook the EE/PDR potential study with the following key tasks:

- Conduct a customer market baseline study using telephone and on-site customer surveys to profile AEP Ohio's residential and non-residential customers.
- Develop baseline consumption profiles, and develop initial building simulation model specifications.
- Characterize the EE/PDR measures.
- Conduct a EE/PDR benchmarking and best practices analysis.
- Conduct benefit-cost analysis.
- Estimate EE/PDR potentials.
- Develop program plans.

These steps are discussed in more detail in Volumes 1 and 2 of the Plan.

1.3 2012 to 2014 EE/PDR Action Plan Report Organization

The remainder of AEP Ohio's EE/PDR Action Plan is divided into the following sections:

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

Section 3: EE/PDR Plan Summary Results details the summary results of Plan electric savings, investment allocations and benefit-cost results.

Section 4: EE/PDR Program Plans presents detailed program plans for AEP Ohio's proposed programs, with full descriptions for new programs.

Section 5: Glossary defines key terms used in the report.

Volume 2 Appendices includes: EE/PDR Potential Study results (Appendix A). Overall EE/PDR Benchmarking results (Appendix B); and EE/PDR Measure Descriptions and Characterizations Results (Appendix C).

2 PLAN DEVELOPMENT

Based on a national review of leading EE/PDR programs, AEP Ohio is proposing a balanced Plan including EE/PDR programs that will achieve significant energy savings, while establishing trade ally and retailer partnerships resulting in lasting market transformation. AEP Ohio's programs will target all major sectors and customer classes, including low-income and small business customers.

AEP Ohio plans to continue offering a diverse Plan of "tried and true" major programs (some of which include sub-program components) across the residential, commercial and industrial sectors, under the banner of gridSMARTOhio. Additionally, in this plan, AEP Ohio also proposes several new programs, research and development activities targeting experimental opportunities, as well as broad-based education and training, targeted advertising, and codes and standards offerings.

2.1 Plan Tactical Objectives

In addition to AEP Ohio's strategic goals provided in the Plan Executive Summary, AEP Ohio also has the following tactical objectives for the 2012-14 Plan:

- Exceed SB 221 resource acquisition goals for 2012 to 2014, while laying the groundwork for long-term market transformation.
- 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.¹³
- Maximize program savings at a minimum cost by striving to achieve comprehensive cost-effective savings opportunities.
- Provide AEP Ohio customers with a single web site¹⁴ to access information on all efficiency programs (residential and business) for electricity savings opportunities.
- Expand the energy efficiency infrastructure in the state - 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).

¹³ AEP Ohio currently teams with Columbia Gas of Ohio on the ENERGY STAR® New Homes Program

¹⁴ <http://www.gridsmartohio.com/>

- Inform and educate customers and students to enable them to use energy more efficiently.

2.2 Planning Process

AEP Ohio's Plan of programs incorporates elements of the most successful EE/PDR programs across North America into program plans designed for the Ohio market and AEP Ohio customers in particular. A substantial amount of information including evaluation studies was used to develop specific programs for AEP Ohio. AEP Ohio also used a benchmarking process to review the most successful EE/PDR programs from across the country, with a focus on successful Midwest programs to help shape the Plan.

As detailed in Figure 11, 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. AEP Ohio's EE/PDR Action Plan is focused on capturing cost-effective *program potential* in its service territory while achieving SB 221 requirements for 2012 to 2014.

Figure 11. 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", U.S. EPA, Figure 2-1.

2.3 Market Segmentation

Segmentation of the market in AEP Ohio is needed to have ongoing and effective outreach and participation across segments and classes of customers. In addition, AEP

Ohio plans to measure geographical participation for geo-targeting opportunities going forward.

Consumer Segmentation

Table 17 presents 2010 data for single-family and multifamily residential customers, including low income.

Overall, 60.4 percent of the total residential sector customers are in the base residential segment that excludes all single-family and multifamily low income customer segments. Most, 93 percent base residential customers live in single-family homes while the remainder lives in multifamily housing.

Overall, 39.6 percent of total residential sector customers are in the low income segment. Most of these customers (84.9%) live in single-family homes, while the remainder lives in multifamily housing.

Table 17. Residential Customer Data - 2010

Customer Segment - 2010	Number of Accounts	Percent of Accounts	Percent of Consumption
Single Family	653,210	93.0%	95.8%
Multifamily	48,969	7.0%	4.2%
Residential (Excluding Low Income--All SF & MF)	702,179	60.4%	63.6%
Single Family (Low Income)	390,629	84.9%	90.0%
Multifamily (Low Income)	69,530	15.1%	10.0%
Low Income Residential--All SF & MF	460,159	39.6%	36.4%
Single Family (SF)	1,043,839	89.8%	93.7%
Multifamily (MF)	118,499	10.2%	6.3%
Total-All Residential	1,162,338	100.0%	100.0%

- (1) Excludes 62,815 accounts (5.1% of total) that do not have income or dwelling type data available.
 (2) Low income residential customers are defined as those having incomes less than 200% of the federal income poverty level.

Table 18 presents 2010 participant data for single-family and multifamily residential customers. Results from the Efficient Products Program are not included since customer-specific data is not available for that program.

Overall, the total residential sector EE/PDR program participation is at 1.2 percent. When comparing the low income segment's participation in EE/PDR programs to that of the base residential segment, there is not a significant difference in the proportion that participate in EE/PDR programs (0.9% of low income segment vs. 1.4% of the base residential segment). Similarly, there is not a significant difference in the EE/PDR program participant savings as a percent of customer segment consumption (0.17% for low income segment vs. 0.23% for the base residential segment). Average participant

savings vs. participant consumption was higher for multifamily than single-family homes, with low income customers savings more on average.

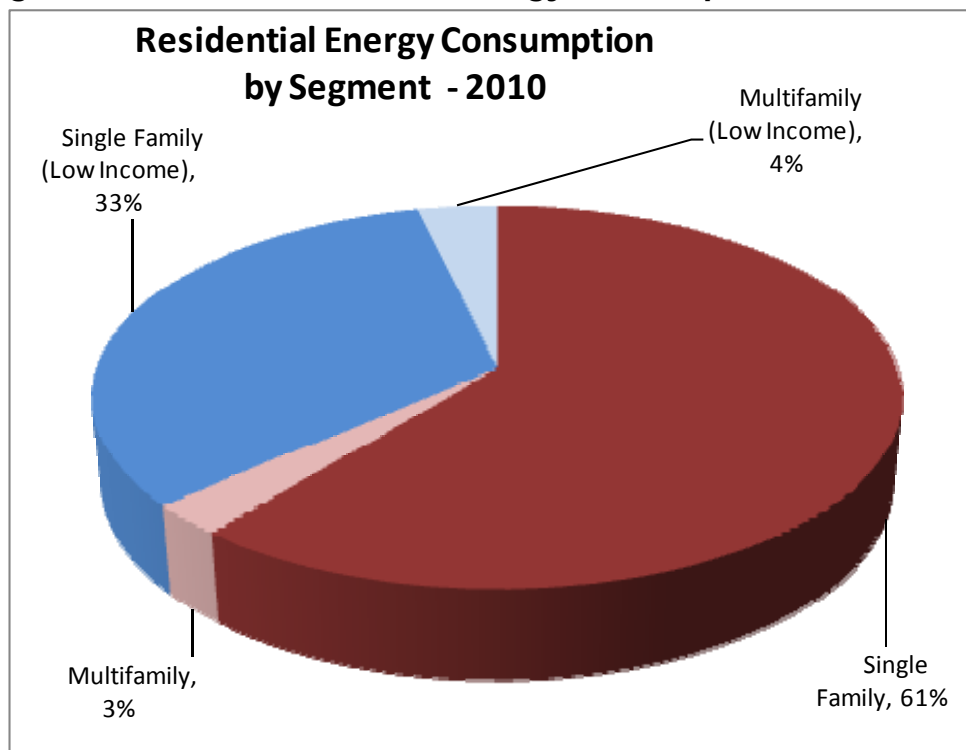
Table 18. Consumer Programs Participation - 2010

Customer Segment - 2010	Program Participant Average Consumption (kWh)	Participants vs. Segment Consumption (percent)	Participant Savings vs. Customer Segment Consumption (percent)	Participant Savings vs. Participant Consumption (percent)
Single Family	13,991	1.5%	0.24%	15.7%
Multifamily	9,537	0.2%	0.05%	24.5%
Residential (Excluding Low Income--All SF & MF)	13,953	1.4%	0.23%	15.8%
Single Family (Low Income)	12,264	1.0%	0.19%	18.2%
Multifamily (Low Income)	10,692	0.1%	0.03%	20.7%
Low Income Residential--All SF & MF	12,240	0.9%	0.17%	18.3%
Single Family (SF)	13,485	1.3%	0.22%	16.4%
Multifamily (MF)	10,026	0.1%	0.04%	22.8%
Total-All Residential	13,449	1.2%	0.21%	16.4%

- (1) Does not include Efficient Products program participation or savings.
- (2) Excludes 62,815 accounts (5.1% of total) that do not have income or dwelling type data available.
- (3) Low income residential customers are defined as those having incomes less than 200% of the federal income poverty level.

Figure 12 shows 2010 single-family and multifamily residential energy consumption by segment. Single-family homes comprised the large majority of residential sector energy usage.

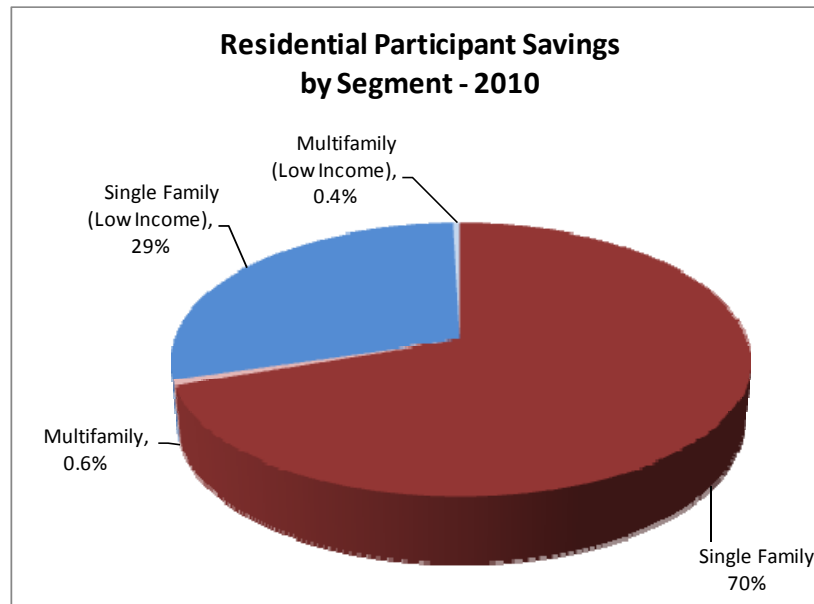
Figure 12. Residential Sector Energy Consumption – 2010



- (1) Excludes 62,815 accounts (5.1% of total) that do not have income or dwelling type data available.
- (2) Low income residential customers are defined as those having incomes less than 200% of the federal income poverty level.

Figure 13 presents 2010 participant savings by segment. Single-family homes comprised the large majority of participants.

Figure 13. Consumer Programs Participant Savings - 2010



- (1) Does not include Efficient Products program participation or savings.
- (2) Excludes 62,815 accounts (5.1% of total) that do not have income or dwelling type data available.
- (3) Low income residential customers are defined as those having incomes less than 200% of the federal income poverty level...

Business Segmentation

Current programs as well as proposed programs are designed to target all segments of the business sector. There are specific target segments that recognize key activities with significant available EE/PDR opportunities.

Table 19 presents 2010 nonresidential customer data by customer type, including the number of EE/PDR participants. Small Office, Manufacturing, Small Retail, and Schools comprised over half the participants.

Table 19. Nonresidential Customer Data - 2010

Type of Customer - 2010	Number of Accounts	Percent of Accounts	Number of EE/PDR Participants
Ag,Mine,Const.	13,389	7.4%	44
Assembly	13,028	7.2%	131
Flat Load Comm	11,422	6.3%	9
Grocery	2,110	1.2%	174
Health Srv	5,055	2.8%	50
Hospitals	320	0.2%	32
Light Industrial	167	0.1%	5
Manufacturing	5,298	2.9%	391
OfficeLarge	1,873	1.0%	226
OfficeSmall	63,364	34.8%	392
Other	609	0.3%	3
RestaurantLarge	517	0.3%	24
RestaurantSmall	6,083	3.3%	64
RetailLarge	1,286	0.7%	243
RetailSmall	48,291	26.5%	383
Schools	4,273	2.4%	313
Warehouse	4,952	2.7%	105
Total	182,037	100.0%	2,589

Table 20 presents 2010 nonresidential participant data. The average Small Office and Other building type participant saved over 40 percent of annual electricity usage. All other participants saved less than 20 percent.

Table 20. Business Programs Participant Savings – 2010

Type of Customer - 2010	Total Participants Consumption (kWh)	Participants vs. Segment Consumption (percent)	Participants Savings vs. Segment Consumption (percent)	Participant Savings as Percent of Participant Consumption
Ag,Mine,Const.	17,460,594	2.8%	0.4%	14.5%
Assembly	85,661,594	8.7%	1.1%	12.5%
Flat Load Comm	7,598,411	1.9%	0.1%	7.6%
Grocery	282,310,000	40.6%	2.1%	5.2%
Health Srv	33,804,896	5.8%	1.0%	17.5%
Hospitals	313,210,000	43.5%	1.5%	3.4%
Light Industrial	13,109,940	30.4%	3.0%	9.8%
Manufacturing	5,285,600,000	31.1%	1.2%	4.0%
OfficeLarge	992,870,000	29.1%	1.9%	6.4%
OfficeSmall	36,176,082	2.6%	1.1%	43.5%
Other	322,021	1.0%	0.4%	42.1%
RestaurantLarge	14,052,537	4.7%	0.2%	3.8%
RestaurantSmall	15,281,966	2.5%	0.4%	14.8%
RetailLarge	458,670,000	29.7%	4.6%	15.5%
RetailSmall	63,560,379	5.0%	0.9%	18.6%
Schools	1,011,400,000	49.5%	1.7%	3.5%
Warehouse	240,470,000	37.7%	5.0%	13.4%
Total	8,871,558,420	-	-	-

Figure 13 shows 2010 nonresidential energy consumption by segment. Manufacturing facilities consume two-thirds of nonresidential customer usage.

Figure 13. Nonresidential Energy Consumption - 2010

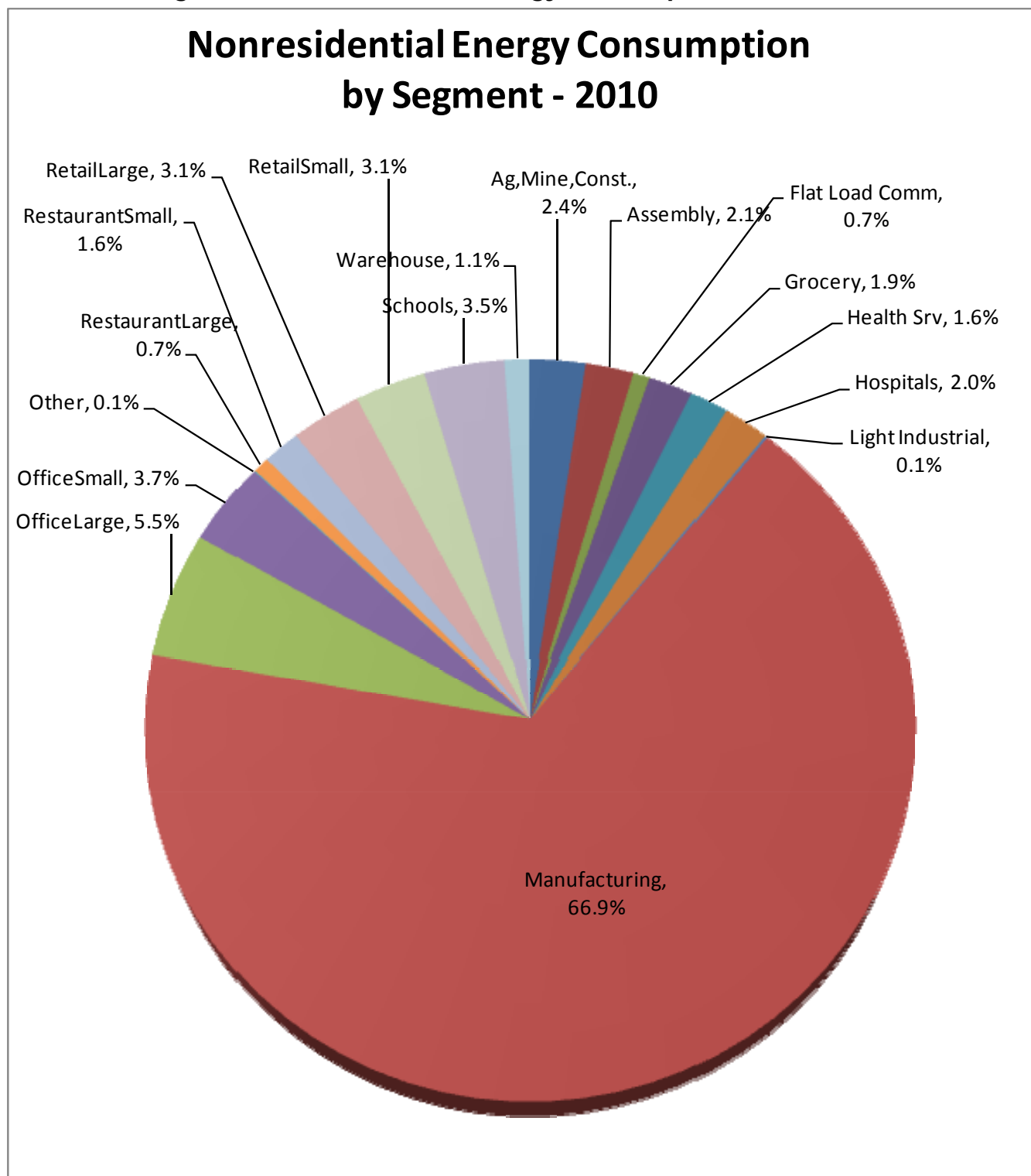
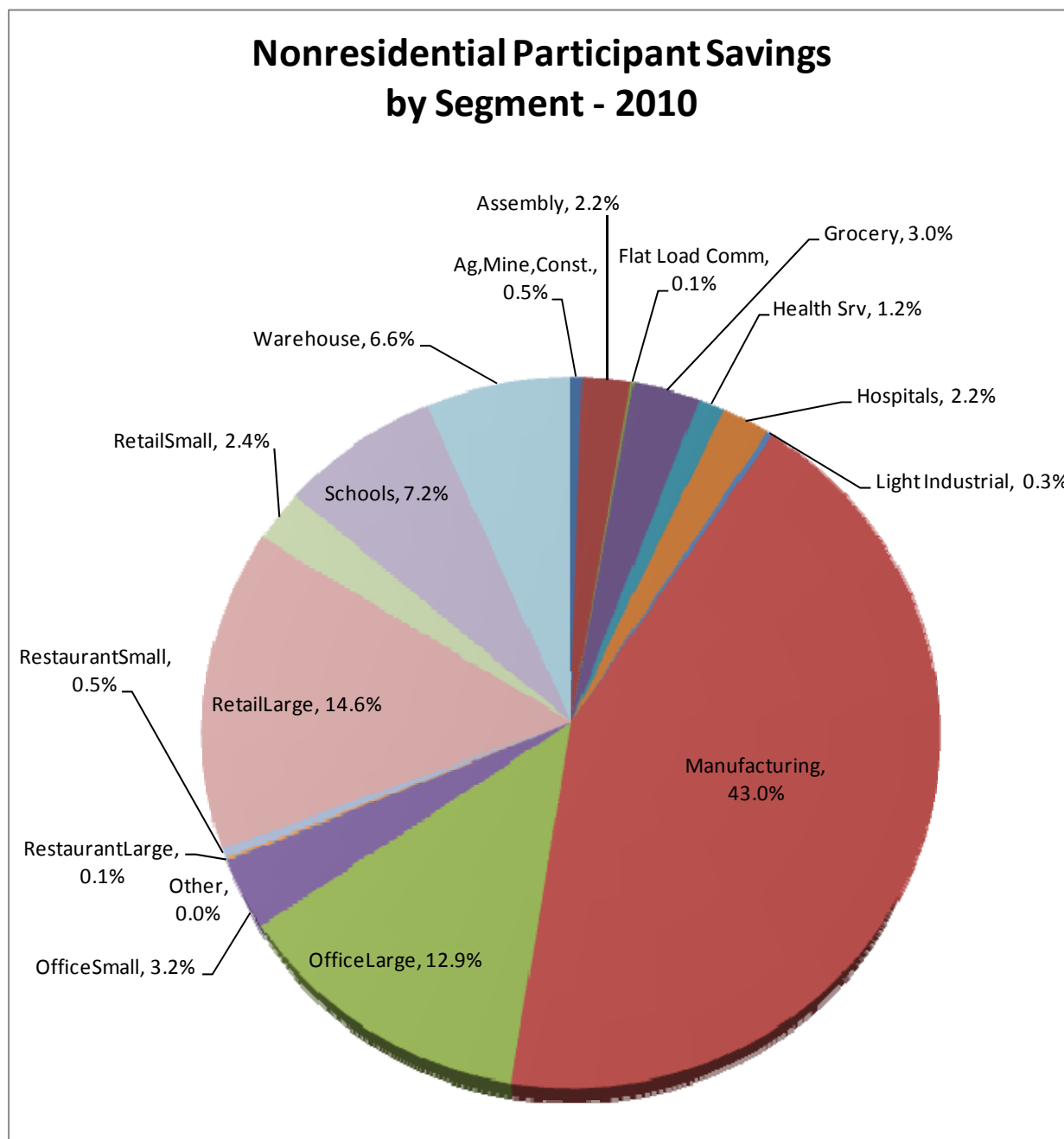


Figure 14 shows 2010 participant savings by segment. Large offices, large retail stores, and schools participated in greater numbers than their share of the AEP Ohio customer base.

Figure 14. Business Programs Participant Savings - 2010



2.4 Stakeholder Participation in the Planning Process

AEP Ohio established the AEP Ohio Collaborative in October 2008, and has met regularly since that time to gain input from its thirty members representing all classes of customers on program planning and to provide feedback on the current plan and its performance.

For this Plan's development, the Collaborative met seven times in 2011 to review AEP Ohio's proposed approaches and had the opportunity to provide feedback throughout the entire process. In addition, individual meetings were held with interested Collaborative members to provide additional time for input. In some cases, Collaborative members brought in third party EE/PDR consultants to assist AEP Ohio.

The Collaborative is facilitated by Battelle and participants include: PUCO Staff, Ohio Consumers' Counsel, Sierra Club, Natural Resources Defense Council, Ohio Environmental Council, Industrial Energy Users, Ohio Manufacturing Association, Ohio Energy Group, Ohio Hospital Association, Ohio Partners for Affordable Energy, Ohio Air Quality Development Authority, Ohio Department of Development (includes the Energy Resources Division and Office of Community Services), Ohio Chamber of Commerce, Ohio Board of Regents, Ohio Farm Bureau, Ohio Council of Retail Merchants, Mid-Ohio Regional Planning Commission, Ohio Poverty Law Center, Corporation for Ohio Appalachian Development, Building Industry Association of Central Ohio, Ohio State Legal Services Division, Association of Independent Colleges and Universities of Ohio, Ground Level Solutions, IMPACT Community Action, CLEADS Community Action, Ohio Energy Project, Environmental Law and Policy Center and Ormet.

2.5 Attempts to Align and Coordinate with Other Public Utility Programs

AEP Ohio has regular communication with other utilities in the state regarding EE/PDR activities and is open to opportunities to work together and share information. One activity that required extensive effort to align and coordinate work was the joint feedback to the PUCO by AEP Ohio, Dayton Power and Light, Duke Energy and First Energy on the draft Ohio Technical Reference Manual. In addition, AEP Ohio has met periodically with other utilities over the last three years to share knowledge on program design and implementation. AEP Ohio, Dayton Power, Duke Energy, First Energy, Columbia Gas, Dominion East Ohio, Vectren and AMP Ohio met in May, 2011 to share experiences, discuss joint program opportunities such as the Energy Code Support pilot included in this Plan, as well as other issues of joint interest. AEP Ohio and Columbia Gas are working together to deliver joint programs as outlined in this Plan.

2.6 AEP Ohio Plan Management

AEP Ohio serves as the overall program administrator for delivery of the Plan. To expedite new program launch, and to take advantage of cutting-edge program implementation experience from other parts of the country, AEP Ohio plans to engage third-party implementation contractors where practical. For existing programs that are operating effectively and within the parameters of the program modifications submitted in this Plan, a first attempt will be made to re-negotiate expiring contracts for program continuity. Existing program contracts that cannot be re-negotiated successfully, as well as new program contracts, will be competitively bid through a RFP process.

AEP Ohio is responsible for high-level administrative, contract and program management, program design and marketing oversight of the selected implementation contractors. A Plan of this proposed size and scope requires careful management oversight. The experience gained from implementation of the 2009-2011 Plan provides the best guidance as to the structure and size required to administer these programs. AEP Ohio will continue to have a small and dedicated group of EE/PDR program staff overseeing third-party implemented programs including compliance activities, as well as research, development, planning and promotion of cross-sector education and awareness activities.

AEP Ohio's EE/PDR Manager is responsible for the overall plan and reports to the Director of Customer Services and Marketing, who reports to the President of AEP Ohio. Five functional areas report to the Manager EE/PDR and include Research & Development, Education & Training, Compliance, Consumer Programs and Business Programs. A staff of sixteen currently manages these activities, and it is projected that an additional eight FTEs will be needed to manage this Plan due to new programs and expansions, as well as significantly more planning, research & development, education and compliance activities.

AEP Ohio has developed a comprehensive tracking database to ensure accurate and comprehensive reporting of all program participation that will be fully launched in 2012. Additionally, the database will allow AEP Ohio to research and track participation by customer class, segment and geographic area, to identify trends and untapped opportunities to advance program goals. Also, AEP Ohio staff has primary responsibility for general energy efficiency education and awareness strategies and activities, including the content of the EE/PDR web site¹⁵, online energy audit software, mass-market media, general education, and efficiency awareness promotions. Research and Development will receive added emphasis to provide mid-stream adjustments and future planning intelligence for the achievement of increasing goals.

¹⁵ See <http://www.gridsmartohio.com/>

In summary, AEP Ohio will provide comprehensive program contract oversight, including management, financial planning and budgeting, regulatory and legal support, as well as:

- High-level guidance and direction to the implementation contractors, including review and revision of proposed annual implementation plans and proposed milestones, and additionally, daily engagement with the contractor team when working through strategy and policy issues.
- Review and approval of implementation contractor invoices and ensuring program activities are within investment and on schedule.
- Review of implementation contractor operational databases for accuracy, ensuring incorporation of data into AEP Ohio's comprehensive Plan tracking database to be used for overall tracking and regulatory reporting.
- Review of measure saving estimates maintained by the implementation contractor.
- Oversight and coordination of evaluation, measurement, and verification contractors.
- Public education and outreach to customers, community groups, trade allies and trade associations.
- Guidance and direction on new initiatives or strategies.
- Communication and direction to implementation contractors regarding other AEP Ohio initiatives that may provide opportunities for cross-program promotion.
- Development, review and approval of printed materials and advertising plans.
- Evaluation of Plan and program effectiveness and recommendations for modifications to programs and approach as needed.
- Periodic review of program metrics, conduct investment analysis, and review evolving program design.
- Research and Development, both internal and oversight of third party providers.

3 EE/PDR PLAN SUMMARY RESULTS

3.1 Plan Framework and Summary

AEP Ohio is proposing to invest a total \$295.9 million (2012\$) on EE/PDR programs during calendar years 2012 to 2014. The division of EE/PDR program investment between residential and business customers is commensurate with each sector's relative contribution to the Plan.

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 Plan also takes into account the realities of program start-up costs for newly proposed programs, and the funds needed to adequately plan, develop, deliver, and evaluate quality programs. The balance of the expenditures will be applied to program administration, including staffing.

Incentive levels and other program elements will be reviewed and modified to reflect changes in market conditions or implementation processes in order to maximize cost-effective savings. Modifications will be reported in the annual reports submitted to the PUCO.

As previously detailed in Table 2, AEP Ohio has developed this plan with the intent to meet or exceed statutory energy savings goals as percent of sales and demand savings as a percent of peak load.

3.2 Benefit-Cost Analysis Background

AEP Ohio has estimated the energy savings, costs and benefits associated with each of the programs included in the proposed Plan. The following section presents the benefit-cost results.

Types of Benefit-Cost Tests

As detailed in Table 21 there are four major benefit-cost tests commonly utilized in the energy efficiency industry, each of which addresses different perspectives. The PUCO established that the Total Resource Cost (TRC) Test be the key test to determine if EE/PDR programs should be offered to customers. 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 21. Comparative Benefit-Cost Tests

	PARTICIPANT TEST (PCT)	RATE IMPACT MEASURE TEST (RIM)	TOTAL RESOURCE COST TEST (TRC)	UTILITY COST TEST (UCT)
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
Avoided Participant Costs			X	
Participant Payment to Utility (if any)		X		X
Utility Admin Costs		X	X	X
Participant Costs	X		X	
Incentive Costs		X		X
Lost Revenues		X		

AEP Ohio evaluated the cost-effectiveness of the measures, programs and overall Plan based on the following standard tests:

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 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 usually is considered at a policy level. The policy level decision is whether the entire Plan's impact on rates is so detrimental that some net benefits have to be forgone.

The Total Resource Cost Test (TRC) is a test that measures the total net resource expenditures of an EE/PDR program from the point of view of the utility and its ratepayers. Resource costs include changes in supply and participant costs. An EE/PDR 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 EE/PDR costs incurred by the utility and its customers.

The Utility System Resource Cost Test (UCT, also referred to as the Program Administrator Test) measures the net benefits of a EE/PDR 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.

Benefit-Cost Test Results

As detailed in Table 9, the proposed AEP Ohio's EE/PDR 2012 to 2014 Plan passes the total resource cost test with a ratio of 2.1.

3.3 Benefit-Cost Methodology

The DSM Resource Assessment Model (DSM-RAM) is a model based on the integration of EE/PDR 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, EE/PDR technology data, past EE/PDR 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 assessments conducted by AEP Ohio for the 2011 residential and

nonresidential baseline studies. DSM-RAM also used the electricity forecast, avoided cost forecast, and electricity prices as described below.

DSM-RAM estimates technical, economic, and achievable EE/PDR resource potential as defined below:

- **Technical EE/PDR potential** describes the amount of EE/PDR savings that could be achieved, not considering economic and market barriers, by customers installing EE/PDR measures. Technical potential is calculated as the product of the EE/PDR measures' savings per unit, the quantity of applicable equipment in each facility, the number of facilities in a utility's service area, and 100 percent current market saturation of the measure. Technical potential estimates include EE/PDR measures that may not be cost effective, and technical potential does not consider market barriers, such as customer's lack of awareness of EE/PDR measures. Therefore, technical EE/PDR potential estimates do not provide a realistic basis for setting EE/PDR program goals.
- **Economic EE/PDR potential** describes the amount of technical EE/PDR 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 EE/PDR programs. The costs for the TRC test are the EE/PDR measure costs, plus the EE/PDR program administration costs. The TRC test does not consider economic or market barriers to customers installing EE/PDR measures.
- **Achievable EE/PDR market potential** estimates the amount of EE/PDR potential that could be captured by realistic EE/PDR programs that include cost effective EE/PDR measures over the forecast period covered by this EE/PDR potential analysis. Achievable EE/PDR potential can vary with EE/PDR program parameters, such as the magnitude of rebates or incentives offered to customers for installing EE/PDR measures and, thus, many different scenarios can be modeled.

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

- **Replace on Burnout (ROB)** means that an EE/PDR 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 EE/PDR measure could be implemented immediately. For instance, installing a low flow shower head 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

DSM-RAM employs several financial tests, including the cost effectiveness tests described above: the TRC, UCT, PCT, and RIM tests.

Simple Customer Payback

The decision model of DSM-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.

EE/PDR Measure Levelized Cost/kWh

EE/PDR supply curves are based on the EE/PDR measure cost per kWh, levelized over the lifetime of the measure. It is calculated by multiplying EE/PDR 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. AEP Ohio used a uniform discount rate of 8.3 percent for both EE/PDR programs and supply-side resources.

Avoided Costs and Energy Costs

EE/PDR 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 AEP Ohio projections of future power plant costs considering expected level of capacity available over future years, and the costs of that capacity.

Administration, Implementation and Direct Costs

Each program's administration, implementation, and direct costs were allocated to the technologies delivered by the program based on the annual kWh savings per measure. 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 Plan cost-effectiveness requirements. AEP Ohio support services that are not specific to individual programs are added as costs at the Plan level for all programs.

3.4 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 Plan 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 AEP Ohio is the total resource cost test perspective. Fortunately, it is possible to achieve required cost-effectiveness at a Plan level while also considering other important criteria. The following list of criteria was considered in developing programs:

- Achieving more benefits net of cost is a higher priority than a high benefit-cost ratio.
- The Plan must provide opportunities for all 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.

While almost all customer sectors will pay a contribution in their utility bill towards the cost of efficiency programs, some customer sectors will not be able to participate unless a program is specifically targeted to overcome their barriers. The Residential Community Assistance Program is an example of a program where the ability of a specific sector to participate was a primary program design goal.

The next section provides details on the projected participation, savings, budgets and benefit-cost test results for ongoing programs. Further details are provided for new programs, including:

- Objectives
- Target Markets
- Duration
- Description

- Incentive Strategy
- Eligible measures
- Implementation Strategy
- Marketing Strategy
- Milestones
- EM&V Strategy
- AEP Ohio Administrative Requirements
- Budget
- Savings Targets
- Benefit-cost Test Results

4 EE/PDR PROGRAM PLANS

The programs developed to achieve EE/PDR goals in this Plan are based on lessons learned from the 2009-2011 EE/PDR Action Plan implementation as well as best-practice programs, with the concepts outlined in a strategic manner. Existing program plans are not repeated from the 2009-2011 EE/PDR Action Plan; however, modifications are included. The plans are proposed as guidelines for more detailed program planning; they are not intended to be operational per se. The intent of the Plan presented here is to provide a sense of scope and scale, and convey the general schedule and resources needed to increase customer participation from previous program efforts in the various markets in which the programs will operate.

Overall, a Plan is presented that covers a broad range of demographic, business, facility, and end-use markets. AEP Ohio's Plan can be divided into consumer, business and cross-sectors with utility administrative functions providing support across for all program areas. AEP Ohio will maintain as part of its functionality the advertising, education, training and research and development budgets. These efforts will leverage existing AEP corporate resources to maximize impact of these outreach and education efforts. The following section presents a summary of the services offered in each program.

4.1 Consumer Programs

For the complete program plan for each ongoing consumer EE/PDR program, please reference the Consumer Program Plans section (pages 47-90) of *Volume 1: AEP Ohio 2009 to 2011 Energy Efficiency/Peak Demand Reduction (EE/PDR) Action Plan*, dated November 5, 2009 (PUCO Docket 09-1089-EL-POR and 09-1090-EL-POR.) Included in each program description below are material program changes as well as participation levels, budget, savings targets and benefit-cost test results.

4.1.1 Efficient Products (ongoing program)

This program will provide incentives and marketing support through retailers to build market share and usage of ENERGY STAR® lighting and efficient appliances primarily through a mark down approach. Customer incentives at the point of sale 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 compact fluorescent lamps (CFLs bulbs) at local retailers. For smaller retail stores that do not have the capability to provide mark downs, rebate coupons will be available.

For appliances, the program will use 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 will be specific in its list of qualifying models, as well as marketing emphasis.

Lighting: AEP Ohio will continue to rely on CFL sales through the over 450 retailers in place throughout its service territory. Additions to the lighting program will include select LED and specialty CFL bulbs. As more LED bulbs become Energy Star approved and cost effective, these measures will be added.

Appliances: Additional funding will allow a broader expansion of incentives for a variety of cost effective appliances, including refrigerators, freezers, clothes washers, dishwashers, televisions and monitors. AEP Ohio is planning for retailer based appliance programs with mid and downstream incentive strategies, depending on the overall cost effectiveness and savings potential for each with the goal of having incentives available on an ongoing basis to match customer needs. To the extent budgets allow, AEP Ohio intends to have incentives available to its customers when they have a buying decision to purchase standard versus high efficiency appliances.

HVAC and Domestic Hot Water: The program will affect the purchase and installation of air source heat pumps and electric hot water heaters when replacing inefficient electric space heating or water heating 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 will work through two distinct market channels – plumbing contractors and the retail Do-It-Yourself stores. AEP Ohio has not yet offered an incentive on the purchase of HVAC equipment and Domestic Hot Water heaters through the Efficient Products Program; however, HVAC equipment rebates are currently available to participants in the Home Retrofit Program.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)				
Measure	2012	2013	2014	Total 2012 – 2014
Clothes Washer - Tier 3 >= 2.2 MEF-w/elec dry	11,203	12,026	13,848	37,077
Clothes Washer - Tier 3 >= 2.2 MEF-w/gas or no dry	239	257	295	791
Convection Oven	11,764	13,355	16,878	41,997
ENERGY STAR® Dehumidifier	3,162	3,677	4,817	11,656
ENERGY STAR® Ceiling Fan	8,355	9,485	11,988	29,828
VSD Pool Pumps	2,260	2,805	4,011	9,076
ENERGY STAR Freezer	28,125	31,554	17,810	77,489
ENERGY STAR TV	30,822	36,814	50,089	117,725
Heat Pump WH - 2.0 EF	1,178	1,535	2,281	4,994
High Eff. Elec. Water Heat - Tank - .95 EF	2,500	2,984	3,992	9,476
Drain Water Heat Recovery (42% efficient or higher)	169	256	437	862
LED Lighting 7W – Indoor	9,657	12,302	9,767	31,726
CFL: 7W Screw-In Indoor	506,504	519,916	327,547	1,353,967
LED Lighting 13W – Indoor	8,135	10,364	8,229	26,728
CFL: 13W Screw-In Indoor	2,005,671	2,058,782	1,297,033	5,361,486
CFL: 18W Screw-In Indoor	251,685	160,177	160,177	572,039
CFL: 23W Screw-In Indoor	156,910	161,065	161,065	479,040
CFL: >25W Screw-In Indoor	32,509	33,370	33,370	99,249
LED Lighting 7W - Outdoor	769	980	778	2,527
CFL: 7W Screw-In Outdoor	37,605	38,601	24,319	100,525
LED Lighting 13W – Outdoor	545	694	551	1,790
CFL: 13W Screw-In Outdoor	134,259	137,815	86,823	358,897
CFL: 18W Screw-In Outdoor	66,067	42,046	42,046	150,159
CFL: 23W Screw-In Outdoor	23,124	23,736	23,736	70,596
CFL: >25W Screw-In Outdoor	10,487	10,765	10,765	32,017
ECM Fan Motor - Central A/C - EL Heat	664	744	915	2,323
ECM Fan Motor - Central A/C - Non-EL Heat	5,534	6,200	7,622	19,356
ECM Fan Motor - Heat Pump	2,435	2,728	3,353	8,516
Ductless Mini Split HP SEER 13	299	371	409	1,079
Ductless Mini Split HP SEER 15	313	388	428	1,129

GSHP, No ER Backup (SEER 13.8)	107	132	146	385
GSHP, SEER 14.5, COP 2.49	100	128	146	374

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience. Electricity and measure cost savings resulting from installing CFLs in lieu of incandescent bulbs result in negative participant costs in 2012 and 2013 (savings.)

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$3,270,629	\$3,768,433	\$3,701,464	\$10,740,525
Incentive	\$8,618,109	\$9,375,439	\$8,158,295	\$26,151,843
Total	\$11,888,737	\$13,143,872	\$11,859,759	\$36,892,368

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	-\$4,031,468	-\$2,223,170	\$4,162,672	-\$2,091,966

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	125,497	126,146	99,931	351,575
Summer Peak Demand (kW)	11,842	12,743	12,904	37,489

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	2.3
Utility System Resource Cost (UCT)	4.0
Participant Cost (PCT)	8.4
Rate Impact Measure (RIM)	0.3

4.1.2 Appliance Recycling (ongoing program)

Many of the refrigerators and freezers being replaced by AEP Ohio customers are still functioning, and, often end up as energy guzzling secondary appliances in basements and garages or are sold in the used appliance market. The Appliance Recycling Program will target these "second" refrigerators and freezers, providing the dual benefit of cutting energy consumption and keeping these older, less efficient appliances out of the used appliance market. The program will provide incentives to remove working units from service and fully recycle their materials. The program offers an environmentally responsible turnkey pick-up and recycling service.

A program addition is to pick up working, inefficient window air conditioning units, and to recycle these older units at the same time the customer has a refrigerator/freezer for pick up.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)				
Measure	2012	2013	2014	Total 2012 – 2014
Refrigerator Recycling	8,727	10,142	13,351	32,220
Freezer Recycling	3,307	3,843	5,059	12,209
Room A/C Recycling	1,363	1,678	2,336	5,377

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience. Electricity and measure cost savings resulting from removing secondary appliances result in negative participant costs (savings.)

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$1,045,676	\$1,252,484	\$1,715,556	\$4,013,715
Incentive	\$1,718,840	\$1,999,819	\$2,635,799	\$6,354,458
Total	\$2,764,516	\$3,252,303	\$4,351,355	\$10,368,174

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	-\$1,530,978	-\$1,769,315	-\$2,316,054	-\$5,616,347

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	18,962	22,045	29,034	70,042
Summer Peak Demand (kW)	3,665	4,344	5,833	13,842
Benefit-Cost Test Results				
Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio			
Total Resource Cost (TRC)	3.7			
Utility System Resource Cost (UCT)	1.7			
Participant Cost (PCT)	NA			
Rate Impact Measure (RIM)	0.3			

4.1.3 In-home Audit (ongoing program)

This program produces long-term electric energy savings in the consumer sector by helping customers analyze and reduce their energy use from a whole house perspective through the installation of upgraded shell measures, such as air sealing and insulation, as well as lighting and high efficiency heating and air conditioning equipment, where cost effective as a whole. A free online analysis will be offered to all customers. The current program will also retain an assessment option for customers that do not qualify for the full in-home energy audit. A program modification will reduce the cost to the customer of the in-home energy audit to match the Columbia Gas offering, currently set at \$50. Incentives for energy efficient measures will be available to all customers who complete either the online analysis or in-home energy audit. Also, AEP Ohio and Columbia Gas plan to offer appropriate reciprocal incentives for shared customers who complete the other utility's in-home energy audits. Multifamily housing will be eligible for participation in this program as a new feature.

The Home Retrofit Program will continue to utilize a three-option approach to capture electric energy savings, with the expectation that option 2 will be less subscribed to over time, given the availability of option 1 and the reduced cost of option 3:

Option 1: On-Line Energy Analysis – This program is unchanged from the previous plan; however, it is now in production and is free to all AEP Ohio customers. Customers who complete the analysis will receive a kit of energy efficiency measures by mail.

Option 2: In-home Energy Assessment – This program is unchanged in design from the previous plan. The \$25 customer cost of the assessment provides a walk-through audit by pre-certified contractors and a list of recommendations. Customers will also receive direct installed energy efficiency measures and a prioritized list of recommendations. This option is available to customers that are not eligible for Option 3, or that do not qualify for the Columbia Gas program, or that are outside of the service territory of Columbia Gas.

Option 3: In-home Energy Audit – This program is planned to be delivered jointly with Columbia Gas. AEP Ohio or Columbia Gas provides the customer a comprehensive energy efficiency audit. The audit is performed by a pre-qualified and certified energy auditor, either directly contracted or sub-contracted to AEP Ohio to deliver the services required. The customer cost of the audit is \$50. For areas where the program is not available in conjunction with a local natural gas utility, the in-home energy audit will be available to customers with electric heating and air conditioning or annual energy usage of 12,000 kWh or more. The auditors perform blower-door, infrared camera, and combustion air tests, and utilize approved software to provide customers a detailed report of energy usage and potential savings associated with improvements. Customers will also receive the direct installed energy efficiency measures and a prioritized list of recommendations. Currently, the joint utility program design for Option 3 is being

tested via a pilot with Columbia Gas of Ohio. AEP Ohio and Columbia Gas of Ohio offer appropriate reciprocal energy efficiency measure incentives for shared customers. That pilot will inform program adjustments as needed.

For any option selected, customers will be eligible for incentives and can choose from a list of pre-qualified contractors to have energy-saving improvements installed.

Similar to the Residential New Construction Program, multifamily housing will be eligible for participation in this program as a new feature in 2012.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)				
Measure	2012	2013	2014	Total 2012 – 2014
Faucet Aerator - 3	4,463	4,914	5,901	15,278
Low Flow Shower	4,875	5,307	6,269	16,451
Pipe Wrap	3,951	4,541	5,790	14,282
Shower Start/Stop	1,823	2,243	3,119	7,185
CFL: Pin-Based (<25W) Indoor	145,547	117,684	159,532	422,763
CFL: Pin-Based (>=25W) Indoor	10,936	14,262	19,333	44,531
CFL: Pin-Based (<25W) Outdoor	13,918	11,254	15,256	40,428
CFL: Pin-Based (>=25W) Outdoor	2,577	3,361	4,557	10,495
LED night light	6,079	7,190	8,277	21,546
LED Holiday Lights (300 bulb string)	18,617	22,258	25,292	66,167
Reduced ACH 0.3 - Central A/C - EL Heat	58	63	74	195
Reduced ACH 0.5 - Central A/C - EL Heat	212	231	272	715
Reduced ACH 0.3 - Heat Pump	417	450	526	1,393
Reduced ACH 0.5 - Heat Pump	1,558	1,684	1,965	5,207

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience. Electricity and measure cost savings resulting from installing CFLs in lieu of incandescent bulbs result in negative participant costs (savings.)

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$2,568,773	\$2,905,706	\$3,472,265	\$8,946,744
Incentive	\$4,341,465	\$2,812,174	\$3,690,284	\$10,843,923
Total	\$6,910,238	\$5,717,880	\$7,162,550	\$19,790,668

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	-\$4,066,641	-\$2,307,032	-\$3,217,785	-\$9,591,458

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	10,904	10,776	13,720	35,401
Summer Peak Demand (kW)	704	695	889	2,288

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	1.4
Utility System Resource Cost (UCT)	0.9
Participant Cost (PCT)	21.2
Rate Impact Measure (RIM)	0.2

4.1.4 NEW HOME (ongoing program)

The New Home Program is also a joint program between AEP Ohio and Columbia Gas of Ohio where service territories overlap. In this Plan, the linear incentive structure is being replaced by a step incentive structure for the two program tiers as the ENERGY STAR requirements become more stringent and the program evolves to better meet the needs of the building market.

AEP Ohio intends to offer a multifamily element to this program, following Energy Star certification guidelines. Any joint opportunities on multifamily with Columbia Gas will be explored.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
ENERGY STAR® Qualified 3.0 - Central A/C - Non-EL Heat	304	299	296	899
ENERGY STAR® Qualified 3.0 - Heat Pump	112	111	110	333

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$237,097	\$261,909	\$302,409	\$801,415
Incentive	\$743,951	\$731,299	\$724,972	\$2,200,222
Total	\$981,048	\$993,207	\$1,027,382	\$3,001,637

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$200,867	\$197,451	\$195,743	\$594,061

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	1,581	1,554	1,540	4,675
Summer Peak Demand (kW)	388	382	378	1,149
Benefit-Cost Test Results				
Benefit-Cost Test		2012-2014 Benefit-Cost Test Ratio		
Total Resource Cost (TRC)		1.0		
Utility System Resource Cost (UCT)		1.1		
Participant Cost (PCT)		5.0		
Rate Impact Measure (RIM)		0.2		

4.1.5 BEHAVIOR CHANGE (new program)

The Behavior Change Program was formerly run as a pilot and now will become a standard program for 2012-2014.

Program	Behavior Change Program
Objective	<p>Investigate energy savings for all residential customers participating in energy use behavior programs. The program focuses on quantifying savings for various energy users utilizing different energy education and social marketing techniques. The primary objectives for the program are to:</p> <ul style="list-style-type: none"> • Generate significant savings for DSM Plan objectives • Develop relationships with AEP Ohio customers leading to other areas of participation in AEP Ohio's Plan of DSM programs • Lower energy bills for the consumer
Target Market	<p>As the focus for this effort is on behavioral change within residences, the program is designed to spur residential customers to take actions to save energy and/or use electricity more efficiently. Proactive outreach efforts will utilize a targeted strategy to influence specific participants.</p>
Program Duration	<p>The Behavior Change program is an ongoing element of the Plan.</p>
Program Description	<p>This program provides tips that are relevant to a customer's home and provides an estimate on how much electricity and money they may save by implementing suggested energy efficiency measures and changing energy usage behaviors. Behavioral Change programs utilize various techniques to educate and influence individual attitudes and behaviors that affect energy usage. These behaviors include habitual behaviors, like turning off lights or adjusting the thermostat, purchasing behaviors, such as buying efficient lights and appliances, and the behavior of participating in utility DSM programs. The Behavior Change Program targets specific and relevant efficiency recommendations to each customer, including information about key energy efficiency programs, making it easier for each customer to take action on the recommendations most relevant to them.</p> <p>Possible motivational strategies include:</p> <ul style="list-style-type: none"> • Home energy reports deliver personalized energy usage information and offer simple energy-saving tips customized to each household. • Direct canvassing utilizes a grassroots, door-to-door approach to inducing behavior change for energy efficiency.

- **School programs** harness the enthusiasm of students and the community focal point of schools to motivate students, teachers, and school districts to mobilize for energy efficiency and reduce energy consumption. Incentives to include a continuation of ongoing AEP Ohio measures.
- **Community education** enhances the efforts of community organizations with hands on training for efficiency mentors and community members.

Incentive Strategy

The Behavior Change Program relies on low to no cost behavioral adaptations. Modest direct financial incentives may be considered if determined to be warranted. Estimated savings and incentive levels will be established based on the type of program implemented, cost of implementation, and participation levels. The behavior program approach analyzed for this plan did not include an incentive as a program component.

Eligible Measures

The Behavior Program target measures are:

- Habitual behavior measures:
 - Adjust thermostat setting
 - Adjust water heater set point
 - Unplug appliances or use smart strips
 - Turn off unnecessary lights
 - Run dishwasher only when full
 - Wash clothes in cold water
 - Line dry laundry
- Small purchasing and maintenance behavior measures:
 - Purchase install and program a programmable thermostat
 - Purchase and install faucet aerators and low flow shower heads
 - Purchase and install compact fluorescent light bulbs
 - Request home energy audit to improve energy efficiency
 - HVAC maintenance
 - Clean refrigerator coils

Implementation Strategy

The implementation strategy(ies) to be employed will be based on the program approach(es) that are determined during the detailed program design phase.

Marketing Strategy	
The marketing strategy(ies) to be employed will be based on the program approach(es) that are determined during the detailed program design phase	
Milestones	
Selection of implementation vendor	3-6 months
Program materials/programming developed; Billing data integration	6-9 months
Launch	9-12 months
EM&V Strategy	
<p>All evaluation activities will be conducted by a third-party evaluation contractor. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.</p> <ul style="list-style-type: none"> The overall goal of the impact evaluation will be to calculate savings values and determine program cost-effectiveness, when possible, through billing analysis. Participant and nonparticipant surveys also will address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as Jon, as interviews with program staff, vendors, manufacturers, and other Solution Providers. The process evaluation will 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. 	
AEP Ohio Administrative Requirements	
<p>AEP Ohio will be responsible for general administrative oversight of the program Plan. It is estimated that a 0.5 full-time equivalent (FTE) will be required for program oversight. Key oversight functions include:</p> <ul style="list-style-type: none"> Recruitment, selection, and management of an implementation support 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 Management of the evaluation contractor 	

- Goal achievement within budget

AEP Ohio and its implementation contractor(s) will follow industry best practices during final program design and start-up to ensure success, including:

- Assessing current market conditions for energy efficiency product availability and pricing
- AEP Ohio Account Manager and customer service training
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch
- Preparing for stronger or weaker than expected participant response

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience. Participation assumed a one year measure life. Therefore, the total savings over the three year period from 2012 to 2014 are the number of participants in the third year, 2014.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Home Energy Report	175,493	202,932	231,689	610,114

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$1,736,418	\$2,039,462	\$2,368,570	\$6,144,450
Incentive	\$0	\$0	\$0	\$0
Total	\$1,736,418	\$2,039,462	\$2,368,570	\$6,144,450
Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$0	\$0	\$0	\$0

Savings Targets

Savings calculations assumed a one year measure life. Therefore, the savings in each year do not accumulate beyond that year. Thus, the cumulative total savings over the three year period from 2012 to 2014 are the savings in the third year, 2014.

Incremental Annual Gross Savings – at Meter (Savings are not Cumulative due to 1 year measure life)				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	35,099	40,586	46,338	46,338
Summer Peak Demand (kW)	4,680	5,412	6,178	6,178

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	1.2
Utility System Resource Cost (UCT)	1.2
Participant Cost (PCT)	NA
Rate Impact Measure (RIM)	0.3

4.1.6 e³smartSM (ongoing program)

This energy efficiency education program, formerly called Conservation Kits, is for students of schools served by AEP Ohio and the curriculum is designed to meet national and state science standards for grades 5-9. Students take home energy efficiency measures and install them as part of the learning experience. The program will be expanded in 2012 to reach more communities throughout AEP Ohio's service territory.

Program Objective	e ³ smart SM Program
Provide energy efficiency education training to middle school teachers and students, as well as measureable energy savings on a per student basis. The pilot program has been so successful that AEP Ohio is expanding it to educate approximately 32,000 students per year, or nearly a third of eligible students in its service territory.	
Target Market	
The e ³ smart SM Program is designed for grades 5-9 school audiences. Some participation by higher grades can be allowed.	
Program Duration	
The e ³ smart SM Program is an ongoing element of the EE/PDR Plan.	
Program Description	
<p>The e³smartSM Program provides curriculum, teacher training, and supplies for in-class instruction about energy sources, transformation, and uses. Students learn how to use energy efficiently at home. With the permission of their parents or caregiver(s), students are provided seventeen items for use and/or installation at home. Items such as CFL bulbs and efficient shower heads save energy directly when installed. Other items such as flow meter bags and hot water temperature cards help students' families gauge how their behavior impacts their energy use and their home energy costs. Learning is evaluated through pre and post testing. Additionally, students conduct pre and post course audits of their home's energy use and are asked to complete a survey about which conservation items they actually installed at home.</p> <p>The curriculum has been carefully aligned with the Ohio Department of Education (ODE) middle school science standards. The curriculum currently contains the following eight topics/sections:</p> <ol style="list-style-type: none"> 1. Introduction to Energy 2. Light Bulbs & Energy 3. Insulation and Air Leaks 4. Heating and Cooling 5. Saving Water and Energy 6. Appliances and Energy 7. Energy Synopsis 	

8. Resources
Incentive Strategy
N/A
Eligible Measures
<p>Following is a list of measures included in the current conservation kit provided to students:</p> <ul style="list-style-type: none"> • 23W Bright White CFL • 13W Soft White CFL • Furnace Filter Whistle • Hot Water Temperature Card • Self-Stick Energy Use Gauge Thermometer • LED Night Light • Closed-Cell Foam Weather-Strip (17' Roll) • Self-Stick Door Sweep • Energy Savers Booklet • Flow Meter Bag • Earth Massage Shower Head • Refrigerator Thermometer Card • Plastic Carrying Bag for Students • Kitchen Faucet Aerator • Bathroom Faucet Aerator • 12-Pack of Draft Sealers • Small Roll of Teflon Tape
Implementation Strategy
<p>The program year runs July to June to match the school year. It is implemented through adoption of the curriculum by teachers, or optimally by districts for a given grade level. Teachers and students convey knowledge and encourage efficient practices and installation of efficiency measures. Participating students engage adults and other family members at home by sharing information learned at school and by seeking approval and assistance installing the efficiency measures at home. A third-party organization administers the program with activities that include recruiting teachers, conducting teacher workshops, ordering teacher and student kits, collecting data, issuing teacher stipends, and supporting teachers and the program coordinator throughout the year. Important considerations for selection of the third-party organization include credibility with teachers, curriculum directors, principals and superintendents, understanding of and compliance with district and state requirements, demonstrated ability to perform, and commitment to energy education.</p>
Marketing Strategy
<p>The program is marketed to schools across the 61 counties served by AEP Ohio. The</p>

implementation contractor promotes the program at science teacher events, at National Energy Education Day (NEED) events, on their web site, through existing relationships with teachers, principals and superintendents, and through direct mail to superintendents when needed. Participating teachers are provided press release templates for their school's use in internal publications or with local members of the press. Additionally, internal communications to AEP employees encourages them to notify teachers in their communities in advance of the program year.

Milestones

The e³smartSM Program is ongoing.

EM&V Strategy

All evaluation activities will be conducted by a third-party contractor. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.

- The overall goal of the impact evaluation will be to validate/calibrate the deemed savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.
- The process evaluation will 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.

AEP Ohio Administrative Requirements

Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program oversight. Key oversight functions include:

- Teacher recruitment
- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Coordination of all educational services
- Data warehousing
- Management of the evaluation contractor
- Goal achievement within budget

AEP Ohio and its implementation contractor will follow industry best practices during

final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above
- Account manager and customer service training
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies
- Completing all program procedures from marketing through verification and payment and conducting a dry-run
- Preparing for stronger or weaker than expected participant response

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)				
Measure	2012	2013	2014	Total 2012 – 2014
Faucet Aerator - 2	24,000	24,000	24,000	72,000
Low Flow Shower	24,000	24,000	24,000	72,000
CFL: 13W Screw-In Indoor - 2	24,000	24,000	15,120	63,120
CFL: 23W Screw-In Indoor - 2	15,120	15,120	15,120	45,360
LED night light	24,000	24,000	24,000	72,000
Air Sealing Package	24,000	24,000	24,000	72,000

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$847,666	\$847,666	\$890,049	\$2,585,382
Incentive	\$212,394	\$212,394	\$182,087	\$606,876
Total	\$1,060,060	\$1,060,060	\$1,072,137	\$3,192,257

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$0	\$0	\$0	\$0

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	7,064	7,064	6,500	20,628
Summer Peak Demand (kW)	1,462	1,462	1,428	4,352
Benefit-Cost Test Results				
Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio			
Total Resource Cost (TRC)	1.9			
Utility System Resource Cost (UCT)	2.6			
Participant Cost (PCT)	NA			
Rate Impact Measure (RIM)	0.4			

4.1.7 Community Assistance (ongoing program)

The former Low Income Program, now Community Assistance Program (CAP), provides energy efficiency services to AEP Ohio customers with limited income to assist them in reducing their electric energy use and managing their utility costs. AEP Ohio low income (up to 200 percent of the federal poverty income level) residential customers are eligible and are typically approved for an energy assistance program such as PIPP (percentage of income payment plan) HEAP (home energy assistance program) or HWAP (home weatherization assistance program.) The program generates energy savings for residential low-income customers through an in-home energy audit and the installation of a wide range of base load measures such as CFL bulbs and refrigerators plus weatherization upgrades. The program can be delivered through community based action agencies or private contractors. While the program is not cost-effective based on standard tests, it has significant non-energy benefits, including assisting customers with limited incomes to reduce their energy costs, improving their standard of living and maintaining their service. AEP Ohio plans to expand multifamily housing eligibility.

As indicated in the market segmentation review, 39.6 percent of AEP Ohio customers are in the low income segment, justifying increased program spending in this area. Most of these customers (84.9%) live in single family homes while the remainder lives in multifamily housing.

The CAP is currently delivered through a network of local community-based agencies that provide EE/PDR and weatherization services funded by the federal and state government, and natural gas utilities. Efficiency services funded by AEP Ohio can be delivered in conjunction with weatherization services funded by other programs, or can be delivered as a stand-alone service through private contractors.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)				
Measure	2012	2013	2014	Total 2012 – 2014
CFL: 18W Screw-In Indoor	66,103	69,154	43,545	178,802
CFL: 23W Screw-In Indoor	43,380	45,383	45,359	134,122
CFL: >25W Screw-In Indoor	8,538	8,932	8,928	26,398
CFL: 18W Screw-In Outdoor	17,352	11,255	11,249	39,856
CFL: 23W Screw-In Outdoor	6,073	6,354	6,350	18,777
CFL: >25W Screw-In Outdoor	2,754	2,881	2,880	8,515
LED night light	370	459	547	1,376
Energy Star Refrigerator	3,963	4,332	3,734	12,029
Refrigerator Recycling	115	140	190	445
Freezer Recycling	44	53	72	169
Faucet Aerator	339	387	473	1,199
Low Flow Shower	370	419	505	1,294
Pipe Wrap	283	336	435	1,054
Heat Pump WH - 2.0 EF	114	152	226	492
High Eff. Elec. Water Heat - Tank - .95 EF	132	160	214	506

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience. Participant electricity cost savings result in negative participant costs.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$4,343,714	\$4,994,582	\$5,469,440	\$14,807,737
Incentive	\$5,422,437	\$5,945,561	\$5,273,101	\$16,641,100
Total	\$9,766,152	\$10,940,143	\$10,742,541	\$31,448,836
Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	-\$882,509	-\$880,960	-\$723,741	-\$2,487,210

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	12,053	12,390	10,874	35,316
Summer Peak Demand (kW)	1,195	1,231	1,068	3,494
Benefit-Cost Test Results				
Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio			
Total Resource Cost (TRC)	0.5			
Utility System Resource Cost (UCT)	0.5			
Participant Cost (PCT)	NA			
Rate Impact Measure (RIM)	0.2			

4.2 Business Programs

For the complete program plan for each ongoing business program, please reference the Business Program Plans section (pages 91-124) of *Volume 1: AEP Ohio 2009 to 2011 Energy Efficiency/Peak Demand Reduction (EE/PDR) Action Plan*, dated November 5, 2009 (PUCO Docket 09-1089-EL-POR and 09-1090-EL-POR.) Included in each program description below are material program changes as well as participation levels, budget, savings targets and benefit-cost test results. For the new programs, complete program descriptions are included.

4.2.1 Prescriptive (ongoing program)

All business (non-residential) customers in AEP Ohio's service territory are eligible to participate in this program. The program provides a simple and easy way to help fund common energy efficiency projects in existing facilities and new construction projects. A prescriptive menu of standardized incentives includes lighting, heating, ventilation, and air conditioning (HVAC), motor drives, refrigeration, and food preparation and storage equipment.

Three primary objectives will focus on increasing: market share, installation rates, and operating efficiency. Incentives typically range from 20 percent to 50 percent of the incremental cost to purchase energy efficient products will be offered to customers. A program enhancement will be to include master metered multifamily facilities.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)

Measure	Unit	2012	2013	2014	Total 2012 – 2014
Advanced Power Strips - Occupancy Sensors	power strip	4,296	4,601	4,691	13,588
Advanced Power Strips - Timer Plug Strip	power strip	16,898	18,095	18,454	53,447
Advanced Power Strips - Load Sensor	power strip	6,884	7,372	7,517	21,773
Advanced Pre-Rinse Spray Nozzle	nozzle	11	12	12	35
Anti-Sweat Heat (ASH) Controls (or Humidistat Controls)	per 36 In. ft. of case	49	53	53	155
CFL: Pin-Based (<25W) Indoor	lamp	13,906	15,246	16,253	45,405
CFL: Pin-Based (>=25W) Indoor	lamp	1,125	1,231	1,310	3,666
CFL: Screw-In (<10W) Indoor	lamp	262	287	85	634
CFL: Screw-In (<10W) Outdoor	lamp	22	25	7	54
CFL: Screw-In (>26W) Indoor	lamp	110	126	135	371
CFL: Screw-In (>26W) Outdoor	lamp	106	117	123	346
CFL: Screw-In (10-15W) Indoor	lamp	4,202	4,606	1,361	10,169
CFL: Screw-In (10-15W) Outdoor	lamp	175	192	57	424
CFL: Screw-In (16-21W) Indoor	lamp	3,092	877	951	4,920
CFL: Screw-In (16-21W) Outdoor	lamp	251	72	78	401
CFL: Screw-In (22-26W) Indoor	lamp	665	729	776	2,170
CFL: Screw-In (22-26W) Outdoor	lamp	40	44	47	131
Delamping	fixture	100,937	103,461	101,461	305,859
Dimmable Electronic Ballasts	fixture	114,261	120,792	123,373	358,426
EC Motor: Reach-In Enclosure	motor	388	421	434	1,243

EC Motor: Walk-In Enclosure	motor	254	275	284	813
Economizer - Chiller / Elec Resist	tons cooling	68	72	73	213
Economizer - Direct Exp / Gas Heat	tons cooling	4,807	5,097	5,156	15,060
ENERGY STAR Connectionless Steamer	unit	20	22	22	64
ENERGY STAR Fryer	unit	20	23	23	66
ENERGY STAR Griddle	unit	23	26	27	76
ENERGY STAR Oven (Convection)	unit	137	149	153	439
Evap Fan Controller for Med. Temp Walk-in	fan	361	381	384	1,126
Floating Head Pressure Controls	tons	991	1,060	1,082	3,133
Heat Pump Water Heater	water heater	25	28	29	82
High Performance T8 Lighting	fixture	40,107	43,688	46,616	130,411
Hot Water Circulation Pump Time Clock	unit	251	269	277	797
Insulated Hot Food Holding Cabinet: Half Size <=0.3 kW	cabinet	120	130	133	383
Intelligent Defrost Control	control	398	423	426	1,247
LED Exit Signs - from CFL	lamp	1,055	1,112	1,131	3,298
LED Exit Signs - from Incand.	lamp	1,098	1,158	1,178	3,434
LED Lighting <10W - Indoor	lamp	55	64	77	196
LED Lighting >=10W - Indoor	lamp	393	452	542	1,387
Night Covers	ln. ft. of case	3,081	3,287	3,337	9,705
Occupancy Sensor	sensor	11,131	12,100	12,935	36,166
Outside Air Economizer for Coolers	tons cooling	700	742	747	2,189
Package system A/C (>=63.3 tons, 10.2 EER)	tons cooling	3,370	3,652	3,775	10,797
Packaged terminal air-conditioner (< 7kbtuh)	tons cooling	708	767	793	2,268
PC Power Management Software	unit	498	532	540	1,570
Photocell	380 W	4,774	5,096	5,282	15,152
Programmable Thermostat - Chiller / Elec Resist	thermostat	19	20	19	58
Programmable Thermostat - Chiller / Gas Heat	thermostat	29	30	30	89
Programmable Thermostat - Direct Exp / Elec Resist	thermostat	337	350	348	1,035
Programmable Thermostat - Direct Exp / Gas Boiler	thermostat	333	348	345	1,026
Programmable Thermostat - Direct Exp / Gas Heat	thermostat	241	252	250	743
Programmable Thermostat - WLHP	thermostat	1,000	1,043	1,034	3,077
Refrigerated Display LED Lighting Strips	case door	13	15	17	45
Screw in cold cathode CFL	lamp	378	435	520	1,333
Split/Package system A/C (< 5.4 tons, 14 SEER)	tons cooling	1,296	1,405	1,452	4,153
Split/Package system A/C (< 5.4 tons, 14 SEER) - Direct Exp / Elec Resist	tons cooling	544	590	609	1,743
Split/Package system A/C (< 5.4 tons, 14 SEER) - Direct Exp / Gas Boiler	tons cooling	471	510	527	1,508

Split/Package system A/C (< 5.4 tons, 14 SEER) - Direct Exp / Gas Heat	tons cooling	3,428	3,714	3,839	10,981
Split/Packaged Air Conditioner (240 - 760 kBtu/h) 11 EER	tons cooling	5,751	6,232	6,443	18,426
Split/Packaged Air Conditioner (240 - 760 kBtu/h) 11 EER - Direct Exp / Elec Resist	tons cooling	234	254	262	750
Split/Packaged Air Conditioner (240 - 760 kBtu/h) 11 EER - Direct Exp / Gas Heat	tons cooling	1,584	1,717	1,775	5,076
Split/Packaged Air Conditioner (65 - 135 kBtu/h) 12 EER	tons cooling	585	634	655	1,874
Split/Packaged Air Conditioner (65 - 135 kBtu/h) 12 EER - Direct Exp / Elec Resist	tons cooling	399	432	447	1,278
Split/Packaged Air Conditioner (65 - 135 kBtu/h) 12 EER - Direct Exp / Gas Heat	tons cooling	2,953	3,200	3,308	9,461
Split/Packaged Heat Pump (<65 kBtu/h) SEER 14 - Heat Pump	tons cooling	36	39	34	109
T5 Lighting	fixture	45,323	47,668	48,136	141,127
Time clock	380 W	9,058	9,647	9,971	28,676
Vending Machine Controller - Cold Drink	unit	748	798	809	2,355
VFD on centrif load - Process or HVAC	HP	9,794	10,490	10,698	30,982
Zero Energy Door	case door	700	742	747	2,189

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$5,297,623	\$5,598,357	\$5,730,430	\$16,626,410
Incentive	\$13,301,262	\$14,092,091	\$14,389,130	\$41,782,483
Total	\$18,598,885	\$19,690,448	\$20,119,560	\$58,408,893

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$29,483,534	\$31,261,902	\$31,928,162	\$92,673,598

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	204,045	215,629	219,589	639,263
Summer Peak Demand (kW)	34,007	35,938	36,598	106,543

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
-	
Total Resource Cost (TRC)	2.0
Utility System Resource Cost (UCT)	5.2
Participant Cost (PCT)	2.9
Rate Impact Measure (RIM)	0.7

4.2.2 Custom (ongoing program)

All business (non-residential) customers in AEP Ohio's service territory are eligible to participate. The Custom program is for cost-effective energy efficiency improvements that reduce energy consumption and/or peak demand not already covered by other AEP Ohio programs. All technologies are subject to eligibility and verification of savings. Customers receive an incentive customized to the specific results of the energy savings technologies implemented. The program will assist larger commercial and industrial customers with the analysis and selection of high-efficiency equipment or processes not covered under the Prescriptive program or other program offerings. The program approach will identify more complex energy savings projects, provide economic analysis and aid in the completion of the incentive application. Incentives will be based on energy savings on a per kWh and per peak kW reduction basis for installed measures.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)					
Measure	Unit	2012	2013	2014	Total 2012 – 2014
<150 tons Centrifugal Water Cooled Chiller COP = 6.0	ton cooling	356	387	401	1,144
<150 tons Centrifugal Water Cooled Chiller COP = 6.0 - Chiller / Elec Resist	ton cooling	18	20	21	59
<150 tons Centrifugal Water Cooled Chiller COP = 6.0 - Chiller / Gas Heat	ton cooling	57	62	64	183
Air Cooled Chiller COP = 3.2	ton cooling	2,555	2,773	2,876	8,204
Air Cooled Chiller COP = 3.2 - Chiller / Elec Resist	ton cooling	24	26	27	77
Air Cooled Chiller COP = 3.2 - Chiller / Gas Heat	ton cooling	76	83	86	245
Code minimum R-20ci or R-38 batt	1000 sqft roof	11,949	11,613	10,657	34,219
Code minimum R-20ci or R-38 batt - Chiller / Elec Resist	1000 sqft roof	209	204	187	600
Code minimum R-20ci or R-38 batt - Direct Exp / Elec Resist	1000 sqft roof	870	846	776	2,492
Daylighting Controls	fixture	16,755	17,443	17,603	51,801
High efficiency, low temperature compressor	compressor	304	327	332	963
High Performance Glazing - Chiller / Elec Resist	1000 sqft glazed	81	86	87	254
High Performance Glazing - Chiller / Gas Heat	1000 sqft glazed	287	303	307	897
High Performance Glazing - Direct Exp / Elec	1000 sqft	337	355	359	1,051

Resist	glazed				
High Performance Glazing - Direct Exp / Gas Boiler	1000 sqft glazed	161	170	172	503
High Performance Glazing - Direct Exp / Gas Heat	1000 sqft glazed	1,774	1,876	1,894	5,544
High Performance Glazing - Heat Pump	1000 sqft glazed	172	181	183	536
High Performance Glazing - WLHP	1000 sqft glazed	484	511	517	1,512
Improved Ceiling Insulation R24ci or R44 batt - Direct Exp / Elec Resist	1000 sqft glazed	1,381	1,342	1,231	3,954
Refrigerant Charge	ton cooling	43,947	45,499	44,834	134,280
Screw Chillers, Water-Cooled COP = 5.7	ton cooling	108	117	122	347
Variable speed HE compressor	compressor HP	7	8	8	23
Window Films on Double Pane - Chiller / Elec Resist	1000 sqft glazed	25	26	27	78
Window Films on Double Pane - Chiller / Gas Heat	1000 sqft glazed	105	112	112	329
Window Films on Double Pane - Direct Exp / Elec Resist	1000 sqft glazed	167	177	178	522
Window Films on Double Pane - Direct Exp / Gas Boiler	1000 sqft glazed	123	130	131	384
Window Films on Double Pane - Direct Exp / Gas Heat	1000 sqft glazed	967	1,022	1,031	3,020
Window Films on Double Pane - Heat Pump	1000 sqft glazed	70	75	75	220
Window Films on Double Pane - WLHP	1000 sqft glazed	369	390	394	1,153
Window Films on Single Pane - Chiller / Elec Resist	1000 sqft glazed	3	3	4	10
Window Films on Single Pane - Chiller / Gas Heat	1000 sqft glazed	10	11	11	32
Window Films on Single Pane - Direct Exp / Elec Resist	1000 sqft glazed	58	60	61	179
Window Films on Single Pane - Direct Exp / Gas Heat	1000 sqft glazed	391	413	418	1,222
Window Films on Single Pane - Heat Pump	1000 sqft glazed	8	8	8	24

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$1,451,054	\$1,493,542	\$1,476,534	\$4,421,130
Incentive	\$7,257,143	\$7,415,314	\$7,272,026	\$21,944,483
Total	\$8,708,197	\$8,908,856	\$8,748,560	\$26,365,613

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$18,593,241	\$18,937,289	\$18,477,164	\$56,007,694

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	66,463	68,303	67,456	202,222
Summer Peak Demand (kW)	8,862	9,107	8,994	26,963

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
-	
Total Resource Cost (TRC)	1.4
Utility System Resource Cost (UCT)	4.5
Participant Cost (PCT)	2.1
Rate Impact Measure (RIM)	0.7

4.2.3 New Construction (ongoing program)

All business (non-residential) customers in AEP Ohio's service territory are eligible to participate in this program. This program is for new construction and major renovation projects to encourage building owners, designers, and architects to exceed standard building practices to achieve efficiency above current building energy code requirements. The program 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. The program provides incentives to new facility owners for the installation of high-efficiency lighting, HVAC, building envelope, refrigeration and other equipment and controls. The program provides a marketing mechanism for architects and engineers to promote energy efficient new buildings and equipment to end users. This whole building approach has incentives for the design team as well as the owner. Currently, Prescriptive and Custom incentives are available for individual energy efficiency measures that exceed the ASHRAE/IESNA Standard 90.1-2004 minimum requirements. A program enhancement will be to include master-metered multifamily buildings.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Building	50	50	50	150

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$500,000	\$500,000	\$500,000	\$1,500,000
Incentive	\$500,000	\$500,000	\$500,000	\$1,500,000
Total	\$1,000,000	\$1,000,000	\$1,000,000	\$3,000,000

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$1,960,685	\$1,960,685	\$1,960,685	\$5,882,055

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	10,000	10,000	10,000	30,000
Summer Peak Demand (kW)	1,230	1,230	1,230	3,690
Benefit-Cost Test Results				
Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio			
Total Resource Cost (TRC)	12.8			
Utility System Resource Cost (UCT)	31.6			
Participant Cost (PCT)	7.0			
Rate Impact Measure (RIM)	2.8			

4.2.4 Express (new program)

Program Objective	Express Program
	<p>The Express Program provides a streamlined, one-stop, turn-key energy efficiency service delivered through registered local contractors. The program generates energy savings through program services and incentives to help qualifying customers reduce energy usage and lower energy costs. Incentives for energy efficiency retrofit projects are paid directly to contractors to speed payment and incentive levels are generally higher than the Prescriptive and Custom Programs, with a cap of 100 percent of the project costs.</p>
Target Market	<p>The Express Program is designed for small business customers. Business (non-residential) customers in AEP Ohio's service territory are eligible to participate. The Express Program targets customers with annual energy consumption of 200,000 kWh or less, based on the last 12 months of billing history. National accounts are not excluded from participation, however, program funding will be reserved for non-National accounts customers to encourage local small business participation. As with residential low income customers, small non-profit customers may need additional incentives to afford energy efficiency improvements, and these opportunities will be considered to remove barriers to this group's participation.</p>
Program Duration	<p>The Express Program is ongoing element of the EE/PDR Plan.</p>
Program Description	<p>An implementation contractor runs the day-to-day administrative side of the program. The implementation contractor is active in contractor recruitment; runs contractor training for online data systems; and conducts project proposal review, monitors and follows-up on contractor proposal status, pre-installation inspections and post-installation inspections, and payment review. The implementation contractor also staffs a contractor and customer phone line for questions and communicates program participation to AEP Ohio on a weekly basis.</p> <p>Rapid project completion is a hallmark of the program design. The program has several timing milestones to keep the projects moving toward completion. For example, participating contractors must commit to finishing projects 60 days after getting a signed contract from the customer. The implementation contractor reviews proposals within three days of contractor submission, and completes pre-installation and post-installation inspections within ten days of completed prerequisite paperwork. The implementation contractor also follows-up on approved proposals after 21 days to ensure contractor diligence in providing and following-up on proposals. Checks are cut to contractors weekly for finished projects with completed data.</p>

Participating small businesses receive:

- A free facility assessment to identify potential energy-saving opportunities
- A proposal that includes a list of recommendations and estimates of energy savings, project cost and payback period
- Incentives paid directly to the contractor, up to 100 percent of the project cost
- Installation of approved energy-savings equipment by a local, trained contractor
- Pre- and post-installation inspections to assure quality and to verify energy savings

Incentive Strategy

Incentives are generally higher in the Express Program as compared to similar measures installed through the Prescriptive and Custom Programs. Incentives vary based on the measure installed.

The Express Program is designed to assist small business owners in overcoming existing barriers to achieving energy efficiency. Common barriers include time constraints, capital constraints, lack of energy efficiency awareness, lack of labor resources, and getting the decision-maker's attention. There are three main ways the program will address these barriers to encourage program participation and ultimately change the small business owner's perception to embrace energy efficiency products and strategies:

- **An Initial Comprehensive Site Survey** – The site survey will identify a variety of electric efficiency measures available to the customer for either immediate installation or longer-term projects. The brief survey report – to be delivered the same day – will provide information for the small business owner to make educated decisions on what measures to implement. The report will discuss financial options identified and available to the customer.
- **Immediate Direct Installation** – There will be some measures the implementation contractor will install immediately during the site survey with the customer's permission. These will include – on the electric side – a few CFL bulbs and a beverage machine occupancy sensor, where applicable.
- **Scheduled Direct Installation** – In addition to the immediate direct installation, customers will also be offered the opportunity to immediately schedule the installation of measures that require capital investment. To facilitate this, AEP Ohio will have agreements with a pool of installation contractors, which can be scheduled to perform installations of the measures identified in the site survey. It is projected that some direct install measures may have incentives up to 80 percent of the market price. The customer will be responsible to pay the remaining balance of the project cost.

Implementation Strategy

The Express Program is delivered to customers by Express Registered Contractors who have been vetted by the implementation contractor and trained on the program and its database. The implementation contractor and AEP Ohio program staff are required to maintain an active approved contractor network in all areas of the AEP Ohio Territory (in Ohio) by talking to trade associations and chambers of commerce.

Express Registered Contractors market projects to their customers and include AEP incentives in their proposals to perform work. AEP Ohio and the implementation contractor have provided Express Registered Contractors with a one-page Express Program Fact Sheet. The document answers basic questions from customers and contractors seeking to participate with the program. Contractors each have their own marketing strategies, but some simply canvas a commercial street for likely, qualified AEP Ohio customers and promote the Express Program through proposals to do work. In this manner, the program has a targeted marketing plan. The implementation contractor may be required to supplement contractor marketing with cooperative canvassing to achieve program goals.

AEP Ohio has launched a public web page for the program linked to the suite of other gridSMART business programs.

Contractor Participation

In order to become a registered contractor, contractors need to fulfill certain requirements, including:

- Licensed Ohio contractor
- Insurance coverage complying with, or exceeding, AEP Ohio requirements,
- Actively working in Ohio
- Back equipment warranties for installed equipment
- Complete a two-page contractor application
- Supply references for 3 or more energy efficiency projects
- Capable of completing projects within 60-day timeframe
- Commit to dispose of any materials in an environmentally friendly manner
- Maintain good standing in all of these areas

The program has a policy for probationary standing if a contractor lapses in respect to these requirements.

The Express Program targets measures that are widely applicable in the small business market segment. Efficient lighting comprises a vast majority of all proposed and installed equipment. The program incentives also support HVAC equipment and

refrigeration equipment, such as display case lighting, electronically commutated motors (ECMs), anti-sweat heater controls and strip curtains.

The Express Program targets low cost measures where the unit energy savings can be reliably predicted. Each of the program measures is summarized below as they are planned to be delivered to customers. The list below has been specified for planning purposes only. AEP Ohio will establish eligible measures and incentive levels as needed in accordance with current market conditions, planning studies, technology development, EM&V results, and program implementation experience.

Lighting Measures

- Compact fluorescent lamps (screw-in and pin-based fixtures)
- LED exit sign
- High-performance T8 fixtures
- Occupancy sensors
- Exterior lighting

HVAC Measures

- Programmable thermostat
- ECM

Refrigeration Measures

- Controls
- Strip Curtains

Implementation Strategy

It is the responsibility of the implementation contractor to recruit select contractors for installation of direct install measures. The customer is responsible for paying the balance of installation costs for efficiency measure implementation and installation. Delivery efforts include coordinating with AEP Ohio Account Managers where appropriate, developing a marketing strategy, and producing the corresponding materials.

Key elements of implementation strategy include:

- **Contractor recruitment and training:** Contractors will be a key delivery mechanism because they will be responsible for the installation of the direct install measures. Contractors will be recruited via mailings, training events, and personal visits.
- **Technical assistance:** The implementation contractor will provide guidance regarding program offerings and participation processes to customers and contractors as needed to minimize confusion and barriers to participation.

Additionally, a facility survey will be offered to customers that will include a high-level walk through energy survey at no cost to the customer and will provide a report to the owner, outlining other energy efficiency improvements that could be installed.

- **Application submittal:** Customers will be asked to complete an incentive application at the time of the site survey and before the start of the installation of qualifying capital-intensive direct install energy efficiency measures. The application explains program qualification, gathers pertinent customer information, and details the program terms and conditions. This tool also provides a checklist of recommended measures from which the customer will select to proceed with the project, and gives a detailed specification for each measure.
- **Follow-up:** Contractors will be asked the proposal status after 21 days and the reasons for non-participation will be recorded.
- **QA/QC review:** Incentive applications will be subject to a QA/QC review to ensure all required forms and documentation have been submitted and that calculation of incentive totals are correct.
- **Project verification:** AEP Ohio will reserve the right to site-verify installations prior to approval and incentive payment.
- **Incentive payment:** To minimize barriers to participation, AEP Ohio will seek to expedite incentive payments.

Marketing Strategy

Both the Implementation contractors and AEP Ohio see marketing and outreach as key aspects of the program. There is a strong push to contact trade groups such as National Electrical Contractors Association (NECA) and the International Brotherhood of Electrical Workers (IBEW) to spread the word about the program and recruit new Express Registered Contractors. Contractors participating in the other gridSMART programs are also being recruited for the Express Program. The implementation contractor conducts webinar events and directing more marketing to contractors to expand the pool of Express Registered Contractors.

Materials and tactics for solution provider marketing would program materials and marketing collateral, sales tools, outreach, and training. Materials and tactics for marketing to customers include direct mail, telemarketing, outreach events, newsletters, bill insets, and printed collateral.

Milestones

N/A

EM&V Strategy

All evaluation activities will be conducted by a third-party evaluation contractor. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.

- The overall goal of the impact evaluation will be to validate/calibrate the deemed savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.
- The process evaluation will 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.

AEP Ohio Administrative Requirements

Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program oversight. Key oversight functions include:

- Customer recruitment
- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Coordination of all educational services
- Data warehousing
- Management of the evaluation contractor
- Goal achievement within budget

AEP Ohio and its implementation contractor will follow industry best practices during final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above
- Account manager and customer service training
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch
- Preparing for stronger or weaker than expected participant response

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants (units installed)					
Measure	Unit	2012	2013	2014	Total 2012 – 2014
Advanced Pre-Rinse Spray Nozzle	nozzle	1	1	1	3
Anti-Sweat Heat (ASH) Controls (or Humidistat Controls)	lamp	8	9	9	26
CFL: Pin-Based (<25W) Indoor	lamp	916	1,006	1,071	2,993
CFL: Pin-Based (>=25W) Indoor	lamp	64	70	75	209
CFL: Screw-In (<10W) Outdoor	lamp	34	36	17	87
CFL: Screw-In (>26W) Outdoor	lamp	7	8	8	23
CFL: Screw-In (10-15W) Outdoor	lamp	264	290	94	648
CFL: Screw-In (16-21W) Outdoor	lamp	175	53	59	287
CFL: Screw-In (22-26W) Outdoor	lamp	33	36	38	107
Delamping	fixture	1,755	1,884	1,943	5,582
Dimmable Electronic Ballasts	fixture	4,203	4,560	4,792	13,555
EC Motor: Reach-In Enclosure	motor	23	25	25	73
EC Motor: Walk-In Enclosure	motor	12	13	13	38
Evap Fan Controller for Med. Temp Walk-in	fan	54	58	58	170
High Performance T8 Lighting	fixture	251	279	303	833
Hot Water Circulation Pump Time Clock	unit	36	39	41	116
Intelligent Defrost Control	control	40	43	44	127
LED Exit Signs - from Incand.	lamp	6	6	7	19
LED Lighting <10W - Indoor	lamp	7	8	10	25
LED Lighting >=10W - Indoor	lamp	46	54	65	165
Night Covers	ln. ft. of case	476	514	527	1,517
Occupancy Sensor	sensor	1,981	2,181	2,366	6,528
Programmable Thermostat - Chiller / Elec Resist	thermostat	3	3	3	9
Programmable Thermostat - Chiller / Gas Heat	thermostat	3	3	3	9
Programmable Thermostat - Direct Exp / Elec Resist	thermostat	39	41	43	123
Programmable Thermostat - Direct Exp / Gas Heat	thermostat	24	26	26	76
Screw in cold cathode CFL	lamp	22	26	31	79
T5 Lighting	fixture	1,577	1,718	1,802	5,097
Vending Machine Controller - Cold Drink	unit	13	14	14	41

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$2,195,533	\$2,379,509	\$2,507,766	\$7,082,808
Incentive	\$1,155,001	\$1,255,546	\$1,321,566	\$3,732,113
Total	\$3,350,534	\$3,635,055	\$3,829,332	\$10,814,921

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$288,763	\$314,002	\$331,276	\$934,041

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	9,736	10,552	11,063	31,351
Summer Peak Demand (kW)	1,623	1,759	1,844	5,226

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	1.2
Utility System Resource Cost (UCT)	1.3
Participant Cost (PCT)	4.3
Rate Impact Measure (RIM)	0.5

4.2.5 Self Direct (ongoing program)

AEP Ohio commercial and industrial “mercantile” customers that consume more than 700,000 kWh/yr can participate. Projects must be cost effective. The program is designed to capture energy savings and demand reduction from large customers with the capability to administer internal energy management efforts of their own. To participate, customers submit an application, calculation spreadsheets and supporting documentation. The application is reviewed and if approved by AEP Ohio and by the PUCO, a one-time payment is made or an EE/PDR rider exemption is applied. Customers accepting an exemption from the rider for a specified number of months are not allowed to participate in any other AEP Ohio EE/PDR programs during the period of exemption. The program allows customers to submit energy efficiency projects that are up to three years old. A change to this program is recommended to increase the incentive payment from 75 percent to 100 percent of the calculated incentive under the Prescriptive or Custom Program.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Project	100	100	100	300

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$1,500,000	\$1,500,000	\$1,500,000	\$4,500,000
Incentive	\$1,500,000	\$1,500,000	\$1,500,000	\$4,500,000
Total	\$3,000,000	\$3,000,000	\$3,000,000	\$9,000,000

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$4,421,370	\$4,421,370	\$4,421,370	\$13,264,110

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	20,000	20,000	20,000	60,000
Summer Peak Demand (kW)	2,460	2,460	2,460	7,380
Benefit-Cost Test Results				
Benefit-Cost Test			2012-2014 Benefit-Cost Test Ratio	
-				
Total Resource Cost (TRC)			2.1	
Utility System Resource Cost (UCT)			4.1	
Participant Cost (PCT)			4.6	
Rate Impact Measure (RIM)			0.7	

4.2.6 Demand Response (ongoing program)

The demand response program is available to non-residential customers only and is used to supplement the peak demand reductions achieved from EE/PDR programs in order to ensure the peak demand reduction benchmark requirements of SB 221 are met. The program includes monitoring, participation and compliance with the current Commercial and Industrial Interruptible Rates offered in the AEP Ohio service territory. In addition, PJM Demand Response Program participation can be utilized, provided mercantile customers commit that resource to AEP Ohio. Program funding is primarily limited to gaining customer commitments for the supplemental peak demand reduction needed by AEP Ohio that could include special arrangements, a standard offer or a bid process.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Facility	7	5	3	15

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience. The cost per MW are based on the projected pricing from PJM for each year.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$200,000	\$200,000	\$200,000	\$600,000
Incentive	\$307,500	\$362,500	\$1,500,000	\$2,170,000
Total	\$507,500	\$562,500	\$1,700,000	\$2,770,000

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$0	\$0	\$0	\$0

Savings Targets				
Incremental Annual Savings – at Meter (Savings are not Cumulative due to 1 year measure life)				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	0	0	0	0
Summer Peak Demand (kW)	20,500	14,500	12,000	12,000
Benefit-Cost Test Results				
Benefit-Cost Test		2012-2014 Benefit-Cost Test Ratio		
-				
Total Resource Cost (TRC)		23.8		
Utility System Resource Cost (UCT)		6.0		
Participant Cost (PCT)		NA		
Rate Impact Measure (RIM)		6.0		

4.2.7 Retro-Commissioning (new program)

Program	Retro-commissioning Program
Objective	Obtain energy savings through the identification and implementation of low-cost, operational adjustments that improve the efficiency of existing buildings' operating systems by optimizing the systems to meet the building's requirements, with a focus on building controls and HVAC systems.
Target Market	The Retro-commissioning (RCx) Program is targeted to medium to large business customers with a peak demand of 500 kW or greater.
Program Duration	The Retro-commissioning Program will be an ongoing component of the AEP Ohio's EE/PDR Plan.
Program Description	<p>The Retro-commissioning Program will be delivered through a network of retro-commissioning providers operating in AEP Ohio's service territory that have been trained in program protocols and participation processes. For smaller facilities, commissioning providers will conduct a targeted assessment of areas with substantial energy savings opportunities such as packaged HVAC units, otherwise called RCx Lite. Larger facilities will be eligible to receive a more comprehensive assessment of building systems and controls.</p> <p>To motivate participation, the cost of the RCx study, up to \$5,000 for RCx Lite and negotiable for more comprehensive RCx studies, is available to customers to assist in overcoming the barrier of customers' reluctance to spend money on a concept that is new to them. To ensure high implementation under this approach, AEP Ohio will institute the following program approaches:</p> <ul style="list-style-type: none"> • Market the program to customers occupying "good candidate" buildings for retro-commissioning through focused efforts of AEP Ohio Account Managers, the program's qualified retro-commissioning service providers, and the program implementation team. • Implement a detailed application screening process to qualify candidates having the highest potential for successful project completion. • The program requires participants to implement all recommended measures that have a simple payback of 1.5 years or less. • Design the Investigation/Implementation phase to ensure the customer, retro-commissioning service provider (RSP) who will provide commissioning services, and installation contractor who will install recommended measures are engaged in finding and fixing problems. This approach will create savings throughout the investigation/implementation process. In addition, the program will operate in a

highly controlled manner with significant technical and managerial oversight provided on each project to ensure project success.

Incentive Strategy

AEP Ohio also will offer financial incentives for assisting customers in overcoming first-cost barriers in implementing RCx study recommendations. The idea is to pay for the initial RCx study in exchange for the customer's commitment to complete those recommendations with short paybacks. Measure implementation support will be provided by the RSP and funded during the retro-commissioning process. This approach will also ensure measures are completed on time and installed properly.

The program will include a strong customer education component to promote the value of RCx services, targeting senior management decision-makers as well as facility operations and maintenance staff. Such education will be provided through program marketing activities, and also may be supported through other industry education and outreach, such as Building Operator Certification (BOC) training. Benchmarking of facility energy use, also part of AEP Ohio's planned market conditioning efforts, will support pre-screening efforts to identify buildings that would be good RCx candidates. Educational program components will promote participation by emphasizing the value of the RCx process, and also help to ensure savings persistence by promoting improved operations and maintenance practices.

Eligible Measures

Eligible measures will vary depending on the business sector served, but should include at least:

- **HVAC systems and controls:** Economizers, Demand Control Ventilation, Heat/Energy Recovery Ventilators, fan and pump controls, head-pressure controls, setback controls, night venting controls.
- **Lighting controls:** Occupancy/vacancy controls, photo-sensors, timer controls.
- **Motor controls:** Variable Frequency/Speed Drives, timer controls.
- **Process controls:** Where applicable.
- **Distribution transformers:** Harmonic filtering and harmonic mitigating.

Implementation Strategy

An implementation contractor will oversee RCx activities conducted by participating RSPs, review RCx studies and provide independent evaluation of savings estimates, and provide post-installation verification. AEP Ohio Account Managers will help market the program and identify potential customers for participation.

Key aspects of the RCx implementation strategy include:

- **RSP recruitment and training:** RSPs will be selected and approved through competitive RFP processes; customers must work with an approved RSP to be eligible for the incentive. RSPs will be the key delivery mechanism as they promote RCx services and available incentives to their customers. RSPs will be required to participate in training sessions to inform them about program incentives,

participation processes, and RCx protocols and requirements. RSPs actively participating in the RCx program and other program offerings will receive regular communications about program activities and changes to ensure their participants are informed and engaged.

- **Customer recruitment:** Program staff, as well as RSPs, will recruit customers. As the program targets larger customers, referrals by AEP Ohio Account Managers will be a key step in customer recruitment. To ensure that business customers perceive EE/PDR programs as a seamless set of offerings, cross-referrals from other programs also will be provided where appropriate.
- **Pre-screening:** To ensure that RCx efforts are focused on high-opportunity buildings, AEP Ohio will promote benchmarking with EPA's Portfolio Manager rating system and other standard industry benchmarks as a pre-screening mechanism.
- **RCx study:** During the study phase, the RSP will conduct a facility assessment to diagnose problems and make recommendations for improvement opportunities, including an assessment of cost, savings and payback. Where applicable, the RCx study may include an assessment of energy savings opportunities eligible for incentives through other AEP Ohio business program offerings, and in all such cases, the incentive levels established by those programs will be used.
- **Study review:** The implementation contractor will review the RCx study and ensure that it meets program standards and that those calculations and methodologies are correct.
- **Project implementation:** It will be the responsibility of the customer to implement those RCx study recommendations that have received program approval and are eligible for implementation incentives.
- **Project verification:** Measures implemented by the customer may be site-measured and verified.

Marketing Strategy

RSPs are the primary conduit for this program and will market the program through their direct relationships with business customers. RSPs will identify, communicate, and enroll customer participants through their own marketing initiatives and with the assistance of AEP Ohio Account Managers, which may be supplemented by the program.

The following are marketing strategies that will help meet program goals:

- Leverage, grow and diversify RSP relationships to achieve aggressive targets
- Educate and leverage existing resources (e.g., Solution Providers, AEP Ohio Account Managers) to their greatest potential to more effectively and economically reach customer segments
- Segment customers by their building type (minimum demand requirement:

500kW), and tailor communications and incentive offerings based on this information

Tactics include co-branded marketing collateral from AEP Ohio. Other tactics to be utilized are direct mail, newsletters, trade shows, and email communications to market the program.

Milestones

Tasks	Timeframe
Selection of Program Implementation Contractor	3 months
Program materials developed	4 months
Recruitment of RSPs	5 months
Program launch – marketing begins	6 months

EM&V Strategy

All evaluation activities will be conducted by AEP Ohio's evaluation contractor. An integrated evaluation approach will be taken that includes the following components:

- Addressing evaluation needs at the onset of program design and collecting evaluation data as part of program administration.
- Assessing and documenting baseline conditions.
- Establishing tracking metrics.
- Conducting primary and secondary research as part of the impact and process evaluations.

The overall goal of the impact evaluation will be to validate/calibrate savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, RSPs, manufacturers, and other Solution Providers.

The process evaluation will be conducted during the first program year and then coordinated with follow-up 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.

AEP Ohio Administrative Requirements

Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program oversight. Key oversight functions include:

- Customer recruitment

- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Coordination of all education and training
- Data warehousing
- Management of the evaluation contractor
- Goal achievement within budget

AEP Ohio and its implementation contractor will follow industry best practices during final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above
- Account manager and customer service training
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch
- Preparing for stronger or weaker than expected participant response

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Building	10	38	50	98

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$365,260	\$555,195	\$730,519	\$1,650,974
Incentive	\$417,208	\$634,156	\$834,416	\$1,885,779
Total	\$782,468	\$1,189,351	\$1,564,935	\$3,536,753

Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$687,500	\$1,045,000	\$1,375,000	\$3,107,500

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	3,653	5,552	7,305	16,510
Summer Peak Demand (kW)	748	1,137	1,495	3,380

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
-	
Total Resource Cost (TRC)	1.5
Utility System Resource Cost (UCT)	2.1
Participant Cost (PCT)	7.2
Rate Impact Measure (RIM)	0.6

4.2.8 Continuous Improvement (new program)

Program Objective	Continuous Improvement Program
	<p>Facilitate a comprehensive and enduring strategic approach to energy reduction at key customer facilities. The Continuous Improvement Program (CIP) will realize widespread, substantial energy savings for participants willing to participate in and partner with the program.</p>
Target Market	<p>Large, account managed business customers with site electric energy expenditures exceeding \$1,000,000 per annum. Direct customer outreach will target executive level decision makers within the customers' organization including CEO's, CFO's, energy managers, facility managers, etc. Target markets will include manufacturing facilities, hospitals, schools, hospitality, large offices, and large government facilities.</p> <p>Participating customers will commit to an on-site executive sponsor of the CIP initiative, an earmarked budget for the program, access to key human resources, the inclusion of an energy CIP statement in the corporate goals, and training on energy issues with existing personnel and new hires.</p>
Program Duration	<p>The Continuous Improvement Program will be an ongoing component of AEP Ohio's EE/PDR Plan. An initial offering may be targeted to a limited number of customers ideally suited to the program. The program would then expand to all customers meeting the eligibility requirements.</p>
Program Description	<p>The Continuous Improvement Program is designed to work with corporate long-term goals regarding demand-side management. Corporate goals should include a specific target, such as "25 percent reduction in energy consumption at all their facilities in Ohio by 2015 as compared to the 2010 baseline." By enabling customers to meet their stated goals, the value of the CIP will be enhanced and AEP Ohio will be better positioned to leverage predictable energy and demand savings from its largest customers.</p> <p>Once a customer site is qualified for the Continuous Improvement Program, the process will begin with a benchmarking assessment of the current baseline as compared to other facilities in the same market sector. A site level executive meeting will occur to analyze the corporate culture regarding energy management as well as the known technical opportunities. The customer will agree to a regular and active measurement program. Once baseline levels are recorded, the facility will undergo a continuous process of improvement plans, plan implementation, and effectiveness evaluation.</p> <p>A facilitator from AEP Ohio or designated by AEP Ohio may be appointed as part of the customer's energy management team, which meets regularly to develop ideas and</p>

prioritize programs. Annually, the AEP Ohio Account Manager will review with the customer overall progress towards the agreed upon strategic goals.

Incentive Strategy

The Continuous Improvement Program will leverage other existing funding mechanisms available to the customer. Additionally, the CIP will attempt to identify other funding mechanisms at the local, state and federal levels.

Participating facilities will receive recognition for their efforts and optional marketing assistance. Where applicable, assistance may be given to achieve certifications.

Eligible Measures

All measures demonstrating energy savings and capable of measurement and verification are eligible for the CIP. Typically, measures would additionally be eligible under another portion of the EE/PDR Plan.

Examples of technologies include:

- Process
- Lighting
- HVAC
- Refrigeration
- Compressed air
- Controls
- Retro-commissioning

Implementation Strategy

Delivery of the Continuous Improvement Program will be achieved primarily through the combined efforts of AEP Ohio EE/PDR program staff, marketing or outreach groups, AEP Ohio Account Managers, and an implementation contractor hired through a competitive bidding process.

AEP Ohio and the implementation contractor will work to generate awareness of the CIP among customers using a targeted approach. Outreach may expand as the program matures, as described in the following marketing strategy.

AEP Ohio and the implementation contractor will work with eligible customers to identify and pre-qualify prospective facilities. This effort may involve meeting with executives to gain insight on strategic energy goals.

If the facility is deemed eligible, the customer will be offered the opportunity to submit a more detailed Continuous Improvement Application. Once received, the application forms the basis for a contractual agreement between AEP Ohio and the customer outlining requirements and deliverables. The customer has a limited time (90 days) to sign the acceptance offer to initiate CIP support from AEP Ohio. Upon customer signature of the incentive offer, the Continuous Improvement Contract will be valid for a

period not to exceed three years, at which time a new contract may be mutually agreed upon.

Once projects are identified under the CIP, the implementation contractor will assist the customer in achieving incentives through other programs, which may or may not be part of the AEP Ohio EE/PDR Plan.

All program-specific administrative requirements will be handled by a third-party implementation contractor, selected through a competitive bid process. The implementation contractor will be responsible for:

- Marketing strategy and messaging.
- Market provider outreach, recruitment, and training.
- Administrative and technical assistance to customers in completing program applications.
- Review of applications.
- Program participant communications.
- Data tracking and reporting.
- Budget tracking and reporting.
- Managing public relations.
- Customer satisfaction and problem resolution.

Marketing Strategy

Solution Providers are the primary conduit for this program and will market the program through their direct relationships with commercial and industrial customers. Solution Providers will identify, communicate, and enroll customer participants through their own marketing initiatives and with the assistance of AEP Ohio Account Managers, which may be supplemented by the program.

The following are marketing strategies that will help meet program goals:

- Leverage, grow and diversify Solution Provider relationships to achieve aggressive targets.
- Educate and leverage existing resources (e.g., Solution Providers, AEP Ohio Account Managers) to their greatest potential to more effectively and economically reach customer segments.

Segment customers by their building type and tailor communications and incentive offerings based on this information.

Tactics include co-branded marketing collateral from AEP Ohio. Other tactics to be utilized are direct mail, newsletters, trade shows, and email communications to market the program.

Milestones	
Tasks	Timeframe
Selection of Program Implementation Contractor	3 months
Program materials developed	5 months
Program launch – marketing begins	6 months
EM&V Strategy	
<p>All evaluation activities will be conducted by AEP Ohio’s evaluation contractor. An integrated evaluation approach will be taken that includes the following components:</p> <ul style="list-style-type: none"> • Addressing evaluation needs at the onset of program design and collecting evaluation data as part of program administration. • Assessing and documenting baseline conditions. • Establishing tracking metrics. • Conducting primary and secondary research as part of the impact and process evaluations. <p>The overall goal of the impact evaluation will be to validate/calibrate savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.</p> <p>The process evaluation will be conducted during the first program year and then coordinated with follow-up 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.</p>	
AEP Ohio Administrative Requirements	
<p>Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program oversight. Key oversight functions include:</p> <ul style="list-style-type: none"> • Customer recruitment. • Recruitment, selection, and management of the implementation contractor(s). • Coordination of marketing strategy/public relations among programs and market sectors. • Coordination of all education and training. • Data warehousing. 	

- Management of the evaluation contractor.
- Goal achievement within budget.

AEP Ohio and its implementation contractor will follow industry best practices during final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above.
- Account manager and customer service training.
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies.
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch.
- Preparing for stronger or weaker than expected participant response.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Facility	10	30	60	100

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$1,000,000	\$1,500,000	\$2,000,000	\$4,500,000
Incentive	\$1,000,000	\$1,500,000	\$2,000,000	\$4,500,000
Total	\$2,000,000	\$3,000,000	\$4,000,000	\$9,000,000
Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$2,460,685	\$3,691,027	\$4,921,370	\$11,073,082

Savings Targets				
Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	10,000	15,000	20,000	45,000
Summer Peak Demand (kW)	1,230	1,845	2,460	5,535
Benefit-Cost Test Results				
Benefit-Cost Test		2012-2014 Benefit-Cost Test Ratio		
Total Resource Cost (TRC)		2.3		
Utility System Resource Cost (UCT)		4.0		
Participant Cost (PCT)		5.6		
Rate Impact Measure (RIM)		0.8		

4.2.9 Energy Efficiency Auction (new program)

Program	Energy Efficiency Auction Program
Objective	Produce long-term electric energy savings in the business sector by introducing a competitive bidding approach to EE/PDR by using elements of competition and timing to fit customers' schedules for capital improvements to enhance business customer interest.
Target Market	The target market consists primarily of larger customers and customer groups that may include industrial and manufacturing facilities, grocery stores, convenience stores, healthcare, government and education.
Program Duration	The Energy Efficiency Auction Program will be an ongoing component of the AEP Ohio's EE/PDR Plan.
Program Description	<p>AEP Ohio's Energy Efficiency Auction Program is designed to take an innovative approach to EE/PDR by using elements of competition and timing to fit customers' schedules for capital improvements to enhance customer interest. The Energy Efficiency Auction Program concept involves the following steps:</p> <ol style="list-style-type: none"> 1) Customers or project sponsors develop projects with significant savings potential. 2) Applicants submit bids identifying projected energy savings and specifying the requested incentive in cost per annual energy savings (\$/kilowatt hour (kWh)). 3) AEP Ohio selects winning applicants based on specified criteria. <p>The Energy Efficiency Auction Program concept is an innovative approach that is being successfully deployed in other jurisdictions.</p> <p>Program participants and project sponsors may include business customers, Energy Service Companies (ESCOs) or other aggregators who organize projects that involve multiple sites. The program addresses customer market barriers such as small savings levels at multiple sites, longer payback periods and organizing implementation contractors, and offers a simplified application process. Program participants also may include customers that are planning large capital intensive projects where energy efficiency incentives are a necessary component to achieve the required payback to make the project viable. Results will be verified through measurement and verification (M&V) activity, and training will be offered on how to correctly track and report savings.</p> <p>Any entity, customer, or project sponsor meeting the application requirements of achieving the minimum target electric energy reduction amount per proposal of 1,000,000 kWh in first-year savings may participate. Eligible project sponsors may include, but are not limited to AEP Ohio business customers, ESCOs, and engineering</p>

firms. Any third-party project sponsor may submit an application with the consent and support of the identified AEP Ohio customer.

To provide participants maximum flexibility in identifying potential projects, the Energy Efficiency Auction Program will not explicitly specify eligible measures. However, measures must meet the following requirements:

- Produce a measurable and verifiable reduction in energy consumption.
- Produce savings through an increase in EE/PDR or better utilization of energy through improved production equipment or controls.
- Be installed in a retrofit application.
- Have a useful life of five years or greater.
- Prove cost-effective using the TRC Test (applies to total project including all measures).

Incentive Strategy

Incentives are offered to winning bidders based on the projected energy and/or demand savings.

Eligible Measures

Examples of eligible measures follow. Project sponsors are free to propose measures not included in the following list, as long as the above requirements are met.

Potentially-Eligible Measures

- Variable-speed drive installations
- Lighting system upgrades
- Compressed air system improvements
- Energy management and control systems
- HVAC system improvements
- Chiller and refrigeration system improvements
- Heat recovery systems
- Efficient transformers
- Process changes that improve energy efficiency or peak demand reduction
- Industrial heat pumps
- Control upgrades resulting in improved EE/PDR
- Retro-commissioning

Implementation Strategy

The following implementation process is proposed for the Energy Efficiency Auction Program:

1. AEP Ohio, and/or its implementation contractor (IC), will advertise the Program to customers and solution providers.
2. Customers/solution providers will submit bids for EE/PDR projects.
3. AEP Ohio/IC will evaluate projects and make awards.
4. AEP Ohio/IC will perform pre-installation metering.
5. Customer will implement proposed project.
6. AEP Ohio will pay 75 percent of the winning bid amount prior to installation.
7. AEP Ohio/IC will perform post-installation metering, as necessary.
8. AEP Ohio will pay the remainder of the winning bid amount based on actual M&V energy savings (based on first year of operation).

Marketing Strategy

Solution providers and AEP Ohio account managers are the primary conduits for the program and will market the program through their direct relationships with business customers. The Marketing strategies that will help meet program goals are as follows:

- Segment customers by energy intensity usage and target marketing to segment through associations, trade shows, direct mail, and email marketing campaigns.
- Educate and leverage existing resources (Solution Providers, Account Managers, External Affairs Managers, and Call Center Representatives) to their greatest potential to achieve broad-based awareness at the lowest possible cost.
- Leverage, grow, and diversify solution provider relationships to extend reach and cultivate increased awareness among different customer segments.

Tactics include direct relationship marketing through personal sales visits to large account customers. Other tactics include direct mail, newsletters, customer events, and email communications.

Initially, program outreach will be focused on market segments with significant savings potential, unique load or energy savings characteristics and the need for specialized delivery or support services including:

- Industrial and manufacturing facilities.
- Grocery stores.
- Convenience stores that are part of a national account.
- Data centers.

Milestones	
Tasks	Timeframe
Selection of Program Implementation Contractor	3 months
Program materials developed	5 months
Initial mailing to solution providers	5 months
Program launch – umbrella marketing begins	5 months
Follow-up telephone calls to solution providers	6 months
Solution provider orientation meetings	7 months
First round of bids due	10 months
First round projects selected	12 months
EM&V Strategy	
<p>All evaluation activities will be conducted by AEP Ohio's evaluation contractor. An integrated evaluation approach will be taken that includes the following components:</p> <ul style="list-style-type: none"> • Addressing evaluation needs at the onset of program design and collecting evaluation data as part of program administration. • Assessing and documenting baseline conditions. • Establishing tracking metrics. • Conducting primary and secondary research as part of the impact and process evaluations. <p>The overall goal of the impact evaluation will be to validate/calibrate savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.</p> <p>The process evaluation will be conducted during the first program year and then coordinated with follow-up 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.</p>	
AEP Ohio Administrative Requirements	
<p>Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program</p>	

oversight. Key oversight functions include:

- Customer recruitment.
- Recruitment, selection, and management of the implementation contractor(s).
- Coordination of marketing strategy/public relations among programs and market sectors.
- Coordination of all education and training.
- Data warehousing.
- Management of the evaluation contractor.
- Goal achievement within budget.

AEP Ohio and its implementation contractor will follow industry best practices during final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above.
- Account manager and customer service training.
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies.
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch.
- Preparing for stronger or weaker than expected participant response.

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Customers	10	37	50	97

Budget

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$800,000	\$1,184,000	\$1,600,000	\$3,584,000
Incentive	\$1,250,000	\$1,850,000	\$2,500,000	\$5,600,000
Total	\$2,050,000	\$3,034,000	\$4,100,000	\$9,184,000
Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$2,710,685	\$4,011,814	\$5,421,370	\$12,143,869

Savings Targets

Incremental Annual Gross Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	10,000	14,800	20,000	44,800
Summer Peak Demand (kW)	1,230	1,845	2,460	5,535

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	2.3
Utility System Resource Cost (UCT)	3.9
Participant Cost (PCT)	5.6
Rate Impact Measure (RIM)	0.8

4.2.10 Data Center (new program)

Program	Data Center Program
Objective	Provide energy efficiency opportunities for both new and existing data centers that lead to energy savings. Incentives will be given to qualifying measures as well as being offered to customers to offset the cost of a preliminary study, when appropriate. The study will be utilized in identifying current and new energy efficiency opportunities.
Target Market	The Data Center Program is designed for data centers seeking to improve the efficiency of new and existing facilities. Special attention will be given to meet the specific needs of each of the three sizes of data centers as defined by the Environmental Protection Agency, which include: Localized Data Centers (500-1,000 sq. ft.), Mid-tier Data Centers (1,000-5,000 sq. ft.), and Enterprise-class Data Centers (5,000+ sq. ft.)
Program Duration	The Data Center Program will be an ongoing component of the AEP Ohio's EE/PDR Plan.
Program Description	The Data Center Program is designed to assist customers in addressing energy efficiency opportunities in both new and existing data centers (i.e., a facility used to house computer systems and associated components). Funding for site evaluations will be offered as well as incentives to assist in the upfront costs of installing the identified energy efficiency opportunities. Although the program is designed to target a typical one megawatt (1 MW) sized facility, data centers from the relatively small to the very large facility will be encouraged to participate.
Incentive Strategy	Incentives will be offered to customers installing qualifying measures or to offset the cost of a preliminary study that will be utilized to identify current and/or new energy efficiency opportunities.
Eligible Measures	<p>The following energy efficient opportunities will be eligible for the Data Center Program:</p> <ul style="list-style-type: none"> • Server Virtualization – Reduce the number of physical servers by using virtual servers on a few host machines. Virtualization is accomplished by creating dynamic firewalls that enable sharing host servers for both central processing unit (CPU) and memory. Server utilization can increase ten-fold. Reliability is usually increased when servers are virtualized. • Energy Star Servers – Energy Star program requires Power Supply Unit (PSU) efficiencies and minimum power factors at various loads for blade servers, pedestal and rack-mounted servers. Savings of 10-15 percent are common as compared to a conventional PSU. • Best-in-Class UPS – Most Uninterruptible Power System (UPS) operate near 20 percent loading with 70 percent efficiency, while newer units with better load

matching operate at about 90 percent efficiency. In both new construction and retrofits, savings of up to 10 percent of overall data center consumption are common.

- **Power Distribution Optimization** – Energy savings can be realized by reducing the number of power transformers and operating at higher voltages. This strategy is achievable by converting the UPS from 277/480 VAC to 240/415 through an autotransformer and eliminating the power distribution unit (PDU) transformer, or the PDU may be fully replaced by a PDU autotransformer.
- **Distribution Power Transformer Optimization** – Energy savings can be realized by installation of filters and/or properly sized distribution transformers designed to mitigate harmonic currents from switched power supplies.
- **Storage Optimization** – Analyze storage strategy and evaluate efficiency on an energy per terabyte basis. Optimization may include right-sizing storage capacity and scalable storage.
- **Row-Oriented Cooling Systems** – Allows for shorter air paths (less fan power) and increased heat transfer with efficiency gains up to 15 percent. This efficiency upgrade, however, is only applicable to new high-density designs.
- **Efficient Floor Layout** – In both new designs and retrofits, cooling energy can be saved with hot-aisle/cold-aisle arrangements, producing savings up to 10 percent. Optimizing floor layout is easily achievable if coupled with server virtualization.
- **Properly Located Vented Floor Tiles** – Requires a professional assessment, but can produce cooling savings leading to overall savings of up to 5 percent. Program should insure wires in subfloor do not restrict airflow.
- **Optimize Temperature and Humidity Set Points** – Often temperature set points are set too low, resulting in reduced reliability and increased energy requirements. American Society of Heating, Refrigerating, and Air-Conditioning Engineers Technical Committee 9.9 has temperature and moisture guidelines for air entering the cold aisle.
- **Economizers** – Cooling system energy can be greatly reduced through economizers. Where applicable, consider using direct outside air, with good filters and evaluate humidity constraints. Other strategies include air-to-air heat exchangers or waterside economizers.
- **Efficient Lighting** – A small measure compared to IT and cooling loads, but often easy to implement and can produce overall savings of up to three percent.
- **PC Power Management** – Software approach to controlling IT equipment outside of the data center. It uses the network to control PC settings and put into hibernate mode. Auto wake-up and hibernate for security and virus scans as well as software updates. There are many products available.

- **Desktop Virtualization** – Users outside of data center use a thin client instead of a PC. Up to 50 thin clients per host machine. In addition to the energy savings, security is enhanced.
- **Emerging Technologies (Power Management)** – Vendors are starting to offer new technologies that manage power distribution and demand. Examples are Hewlett Packard Proliant Server Systems Dynamic Power Regulator and VMWare Enterprise Level Latest Version – Distributed Power Management. Program may evaluate effectiveness of these technologies as they evolve.
- **Optimize Data Center Cooling Technology** – Improving the temperature change across the Computer Room Air Conditioning unit (CRAC) or installing high efficiency cooling systems can produce energy savings.

Implementation Strategy

Key aspects of the Data Center Efficiency program implementation strategy include:

- **Solution Provider Recruitment and Training:** Solution Providers will be a key delivery mechanism for the program as they promote participation and available incentives to their customers. Solution Providers will be recruited to participate in training sessions to inform them about program incentives, participation processes, and requirements. Solution Providers actively participating in the Smart Ideas program receive regular communications about program activities and changes to ensure they are informed and engaged.
- **Customer Recruitment:** Customers will be recruited by Implementation Contractor marketing and outreach activities, AEP Ohio Account Manager referrals, and Solution Providers. To ensure that commercial and industrial (C&I) customers perceive AEP Ohio EE/PDR programs as a seamless set of offerings, cross-referrals from other programs will also be provided where appropriate.
- **Technical Assistance:** The program implementation contractor will provide site evaluations and guidance regarding program offerings and participation processes to customers and Solution Providers as needed to minimize confusion and barriers to participation.
- **Application Submittal:** Customers will submit incentive applications and required documentation after installation of qualifying energy efficiency measures has been completed.
- **Quality Assurance/Quality Control (QA/QC) Review:** Incentive applications will be subject to a QA/QC review to ensure all required forms and documentation have been submitted and that the calculation of incentive totals are correct.
- **Project Verification:** AEP Ohio will reserve the right to site-verify installations prior to approval and incentive payment.
- **Incentive Payment:** To minimize barriers to participation, AEP Ohio will seek to expedite incentive payment.

Marketing Strategy

Solution Providers and AEP Ohio account managers are the primary conduits for this program and will market the program through their direct relationships with their business customers.

Milestones

Tasks	Timeframe
Selection of Program Implementation Contractor	3 month
Program materials developed	4 months
Program launch – marketing begins	5 months

EM&V Strategy

All evaluation activities will be conducted by a third-party evaluation contractor. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.

- The overall goal of the impact evaluation will be to validate/calibrate the deemed savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.
- The process evaluation will 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.

AEP Ohio Administrative Requirements

Initial program administration will be conducted by AEP Ohio EE/PDR personnel and Customer Services account representatives. To develop and manage the third-party implementation, it is estimated that 0.5 FTE equivalent will be required for program oversight. Key oversight functions include:

- Customer recruitment
- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Coordination of all education and training

- Data warehousing
- Management of the evaluation contractor
- Goal achievement within budget

AEP Ohio and its implementation contractor will follow industry best practices during final program design and start-up to ensure success, including:

- Following an integrated evaluation approach as described above
- Account manager and customer service training
- Establishing requirements for supporting documentation, analysis methods, and reporting requirements on technical studies
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch
- Preparing for stronger or weaker than expected participant response

Participation

The following participation levels have been used for planning purposes. However, AEP Ohio may adjust qualifying energy efficiency measures and anticipated participation levels as necessary in accordance with current market conditions, EM&V results and program implementation experience.

Incremental Annual Participants				
Measure	2012	2013	2014	Total 2012 – 2014
Project	10	15	20	45

Budget

The following budget has been used for planning purposes. However, AEP Ohio may adjust program budgets as necessary in accordance with current market conditions, EM&V results, and program implementation experience.

Incremental Annual Budget				
	2012	2013	2014	Total 2012 – 2014
Administrative	\$538,583	\$807,874	\$1,077,165	\$2,423,622
Incentive	\$398,950	\$598,425	\$797,900	\$1,795,275
Total	\$937,533	\$1,406,299	\$1,875,065	\$4,218,897
Incremental Annual				
	2012	2013	2014	Total 2012 – 2014
Participant Costs	\$807,986	\$1,211,978	\$1,615,971	\$3,635,935

Savings Targets

Incremental Annual Savings – at Meter				
	2012	2013	2014	Cumulative Total 2012 – 2014
Energy (MWh)	3,990	5,984	7,979	17,953
Summer Peak Demand (kW)	495	743	990	2,228

Benefit-Cost Test Results

Benefit-Cost Test	2012-2014 Benefit-Cost Test Ratio
Total Resource Cost (TRC)	1.4
Utility System Resource Cost (UCT)	2.0
Participant Cost (PCT)	5.3
Rate Impact Measure (RIM)	0.6

4.3 Cross-Sector Programs and Other Activities

AEP Ohio's current cross-sector activities include:

- Education and Training
- Targeted Advertising
- Research and Development (formerly Pilot)

AEP Ohio proposes five new cross-sector activities or other programs for 2012 to 2014:

- Codes and Standards
- Business Behavior Change
- T&D System Efficiency Improvements
- gridSMART Demonstration Project EE/PDR Savings
- Customer Power System Efficiency

4.3.1 Education and Training

Program	Education and Training
Objective	To raise awareness about the benefits of energy efficiency, to promote adoption of energy efficient behaviors and technologies, and to continue to build demand for AEP Ohio EE/PDR programs.
Target Market	The Education and Training Program is targeted to customers, customer groups, contractors, trade associations, civic associations and employees.
Program Description	<p>This program will continue to coordinate AEP Ohio's efforts to provide education, training and direct outreach for customers, customer groups, contractors, trade associations, civic associations and employees. Activities and materials will be tailored to specific audiences: facilities managers, building operators, financial decision makers, builders, contractors, trade associations, civic organizations, workforce development practitioners and students, and AEP Ohio employees whose work brings them in contact with customers.</p> <p>Education and training participants will be surveyed for feedback on relevance, quality and satisfaction with activities. Pre- and post-learning will be evaluated. Customer Services employees will be surveyed annually with results compared to the 2011 baseline survey. Third-party implementers may be selected via competitive bids to assist with education and training activities. Audiences for training and education activities include:</p> <ul style="list-style-type: none"> Commercial & Industrial (C&I) Customers: Customer education events will continue to be offered via webinar and face-to-face seminars at multiple sites - Athens, Cambridge, Canton, Columbus, Piketon, Steubenville and others as needed to permit customers to participate while minimizing travel. Seminars will continue to feature subject-matter experts, trade allies, and hands-on demonstrations of high efficiency technologies eligible for C&I programs. Going forward, training activities will be targeted for customers within specific segments, such as large industrial, polymer manufacturers, wastewater treatment, data centers, commercial food service, healthcare, and commercial property managers, for example. <p>These programs will be designed based on current participation as well as EE/PDR potential within a given segment. Content and outreach will be designed to increase participation by key decision makers, plant managers, finance managers, treasurers, energy managers and sustainability coordinators. Technical, in-depth training will be offered for building operators, facilities managers, designers, engineers and others whose day-to-day practices influence energy use. New to this Plan will be the exploration of opportunities to develop</p>

workforce skills in alliance with vocational and post-secondary schools to build the supply of knowledgeable staff to help C&I customers commit to continuous improvement of their energy utilization. Customer education programs will be marketed to appropriate customer segments across the 61 counties served by AEP Ohio. Marketing may include contact by customer service account representatives, direct mail, E-mail, and/or telephone. Overall objectives will be to develop knowledgeable and informed customers and EE/PDR providers to identify energy saving opportunities and take action to achieve long-term efficiency gains.

- **Customer Service Employees:** AEP Ohio C&I customers have account representatives who assist them with new service, changes, power quality, billing inquiries and more. Whether power engineers or representatives with more business than engineering training, all customer service employees are expected to assist customers with EE/PDR. Accordingly, they have participated in training on every one of AEP Ohio's programs as they have launched. Customer service employee training will continue through webinars, face-to-face meetings, and E-mail to continue to build staff knowledge about EE/PDR programs, to help them identify customers' energy efficiency opportunities, and to assist customers in applying for, monitoring and re-investing incentives in ongoing energy efficiency practices and equipment. Training will cover programs, technologies, decision-making support, financing and the benefits of energy efficiency to customers, their communities and AEP Ohio. New to the 2012-2014 plan will be the development of more on-line, on-demand education and training resources. Objectives for training will be to raise awareness of the benefits of energy efficiency and to increase customer participation in AEP Ohio programs.
- **Customer-Facing Employees:** Meter readers, line crews, field technicians, and community affairs representatives are among the many AEP Ohio employees who interact with customers daily - though they are not identified strictly as "customer service" employees. To date, many of these customer-facing employees, or their supervisors, have participated in briefings about AEP Ohio's EE/PDR programs. All have received printed materials for them to share with customers when opportunity and safety permit. Education activities will continue to help customer-facing employees understand the benefits energy efficiency can bring to communities, customers and AEP Ohio, to increase their awareness and understanding of programs to help business and residential customers save energy and money, and to encourage them to share information about these programs with the customers they encounter and with others in their communities.
- **Trade Associations:** AEP Ohio will plan and implement outreach activities tailored for trade associations whose members may be customers, and/or may provide services to customers. These activities will be coordinated with, and

marketed through customer service employees, third-party implementers, direct mail, E-mail, and/or telephone. This outreach effort will develop targeted presentations, recruit and train presenters, and deliver presentations to help trade associations' members understand the benefits energy efficiency brings to customers and to their members, to raise awareness of AEP Ohio programs, to help them participate in these programs as contractors and/or as customers, and to help them provide feedback to AEP Ohio.

- **Civic and Other External Organizations:** AEP Ohio will plan and implement outreach activities tailored for civic associations comprised largely of business representatives whose regularly scheduled education meetings present opportunities to raise awareness about AEP Ohio's EE/PDR programs. These activities will be coordinated with, and marketed through community affairs and customer service employees, third-party implementers, direct mail, E-mail, and/or telephone. This outreach effort will develop targeted presentations, recruit and train presenters, and deliver presentations to help civic organizations' members understand the benefits energy efficiency brings to customers and to communities, to raise awareness of AEP Ohio programs, to help them participate in programs, and to help them provide feedback to AEP Ohio.

Implementation Strategy

Education and training participants will be surveyed for feedback on relevance, quality and satisfaction with activities. Pre and post-learning will be evaluated. Customer Services employees will be surveyed annually with results compared to the 2011 survey baseline. Third-party implementers may be selected via competitive bids to assist with education and training activities.

4.3.2 Targeted Advertising

Program	Targeted Advertising
Objective	The Targeted Advertising program is designed to build customer awareness of energy efficiency in support of AEP Ohio EE/PDR programs and also to encourage market transformation in support of AEP Ohio's commitment and key goals of this Plan.
Target Market	This program will target the mass market, as well as business customers.
Program Duration	This program is expected to be ongoing.
Program Description	<p>Media outreach and advertising primarily is for the mass market, but outreach also will target small commercial and industrial customer participation. This Program will be directly managed by AEP Ohio and it is expected to be ongoing. The program is designed to increase customer adoption of EE/PDR programs as well as bringing AEP Ohio's commitment to energy efficiency to its customers.</p> <p>AEP Ohio will plan a media campaign and outreach efforts to address the lack of awareness of their customer base to EE/PDR programs in a variety of ways. In addition, general energy education is a key focus. The development and distribution of targeted marketing materials and participation in promotional events also is a primary focus.</p> <p>There are several barriers to the adoption of energy efficiency. In some cases, it is simple lack of customer awareness or customers' misperception. In other cases, it is a lack of contractor awareness or support to make efficiency a realistic decision choice for customers. For other cases, many technology choices are made spur of the moment or in a fail and replace scenario, where the person or contractor contacted are aware of the Plan programs and make the efficient decision. In all cases, these programs should further AEP Ohio's commitment to efficiency and bridge the Plan program goals and the consumer lack of adoption.</p> <p>The Targeted Advertising program will focus on improving customer awareness and adoption of EE/PDR programs specifically, as well as encourage market transformation and adoption of energy efficiency in general through the following activities:</p> <ul style="list-style-type: none"> • Market research. • Advertising development. • Advertising campaigns. • Program promotional materials and displays. • Event marketing and outreach campaigns. • Customer surveys to identify market transformation opportunities and impacts.

4.3.3 Codes and Standards Support

Program Objective	Codes and Standards Support Program
	<p>The Codes and Standards Support Program objective is to increase energy savings in new construction and renovated buildings in both the residential and commercial sectors by: 1) improving compliance levels with existing building energy codes, and 2) supporting and informing periodic energy code updates as warranted by changing market conditions.</p>
	<p>Target Market</p>
	<p>AEP Ohio program staff will collaborate with: 1) state agencies responsible for approving energy codes and adopting code changes; 2) local entities responsible for energy code compliance enforcement, and 3) regional and national organizations that track market trends to provide insight into best practices in energy code improvement and enforcement. Training to promote energy code compliance would target local code officials and building design professionals (e.g., engineers, architects, specifiers, builders and contractors.)</p>
	<p>Program Duration</p>
	<p>The Codes and Standards Support Program will be an ongoing component of the AEP Ohio's EE/PDR Plan.</p>
	<p>Program Description</p>
	<p>Building energy codes are widely recognized as a relatively simple, cost-effective means of accruing substantial lifetime energy savings in new and renovated buildings. Though the State of Ohio has barriers to the effective implementation of improved building energy codes, AEP Ohio believes the Code and Standards Support Program will reduce energy consumption in its service territory and help improve compliance with existing building energy codes.</p> <p>Many code officials lack the time, knowledge and resources necessary to effectively enforce existing codes and to stay current on market trends that warrant gradual code updates over time. These challenges are particularly pronounced as a result of the current difficult economic climate. Furthermore, building design and construction professionals also may be confused about certain code requirements and would likely benefit from additional education and training.</p>

The following is a list of the primary barriers in this market and respective program elements addressing those barriers:

Market Barriers and Program Elements

Market Barrier	Program Element
<ul style="list-style-type: none"> Lack of knowledge and resources to facilitate compliance with existing codes. 	<ul style="list-style-type: none"> Participation on committees and collaboration with relevant stakeholders to promote the exchange of information.
<ul style="list-style-type: none"> Inconsistency in code implementation and enforcement across the state. 	<ul style="list-style-type: none"> Trainings for code officials and the building community.
<ul style="list-style-type: none"> Lack of resources to advocate for adoption of new codes. 	<ul style="list-style-type: none"> Advocacy in support of adopting new codes, as appropriate.

Products and Services

The Codes and Standards Support Program will strive to maximize energy savings through adherence to the statewide building energy code across the local jurisdictions within the AEP Ohio's service territory. The program will employ a variety of tactics aimed at: 1) improving levels of compliance with the existing building energy codes, and 2) supporting and informing periodic updates to the energy code as warranted by changing market conditions. Specific program activities will depend on the market needs expressed by local code officials. Potential activities include efforts to:

- Better prepare code officials and building professionals to adhere to existing standards.
- Provide data and market insights to document the specific local benefits of code enforcement and to inform energy code changes over time.
- Ensure gridSMART incentive programs align well with local energy codes.
- Collaborate with relevant stakeholders to help build a more robust community working to advance strong and effective building energy codes across the local jurisdictions within AEP Ohio's territory.
- Advocate for periodic energy code updates.

Eligible Measures

A calculation methodology to apportion energy savings attribution from energy codes will be developed and approved by the PUCO.

Implementation Strategy

Upon program approval by the PUCO, AEP Ohio plans to immediately engage stakeholders in assessing code requirements and compliance status, as well as indentifying best avenues for code enhancement throughout the service territory.

Program activities will be selected based on research into effective approaches implemented in leading jurisdictions (e.g., California and Massachusetts), as well as feedback from state agencies and local code officials. Once program activities are selected, program staff will maintain a consistent level of activity and engagement with

relevant stakeholders.

Key elements of the implementation strategy may include:

- Supporting energy code adoption through participation in an energy code adoption committee for both minimum energy code requirements, and voluntary “stretch codes” (such as LEED and other sustainable/green codes)
- Providing technical support to a code adoption committee (e.g., benefit cost analysis of potential code updates, research and information sharing related to the market penetration of particular energy efficient technologies)
- Providing public testimony in support of code adoption
- Ensuring that ongoing EE/PDR programs align well with energy code requirements
- Providing funding and/or other resources to better equip local code agencies to enforce and improve energy code compliance over time. Program staff may select a set of jurisdictions to receive a higher level of assistance on an annual basis. This will help increase the level of impact on those target communities with a high likelihood of producing the greatest amount of incremental savings. Support provided to these target jurisdictions may include activities such as:
 - Classroom training sessions for code officials, and building professionals (architects, engineers, specifiers, builders and contractors)
 - Brown bag training sessions for code officials, and building professionals at their places of business via a circuit rider
 - Field training sessions for code officials and building professionals
 - Purchasing energy code books for officials that currently lack such resources
 - Supporting energy code-related certifications for code officials
 - Conducting energy code compliance assessments by 2017 to fulfill ARRA requirements to demonstrate 90 percent energy code compliance (this could be done in coordination with AEP Ohio EE/PDR program evaluation activities)
 - Collaborating with the Midwest Energy Efficiency Alliance (MEEA) and other regional or national groups to support research on and the adoption of building codes and equipment standards

Marketing Strategy

Key elements of the marketing strategy will include:

- Direct outreach to local code officials and to other local officials drawing on industry association contact lists (e.g., the International Code Council).
- Participation in a committee conducting activities related to building code enhancement.
- Communications with other AEP Ohio EE/PDR program implementation staff in

order to cross-market across programs.

- Easy-to-locate information posted on the gridSmartOhio.com web site.

EM&V Strategy

All evaluation activities will be conducted by AEP's evaluation contractor. An integrated evaluation approach will be taken that includes the following components:

- Addressing evaluation needs at the onset of program design and collecting evaluation data as part of program administration.
- Assessing and documenting baseline conditions.
- Establishing tracking metrics, especially baseline code compliance per major local jurisdiction.
- Developing and refining deemed savings methodologies for estimating program savings from code enhancement and adoption activities.
- Conducting primary and secondary research as part of the impact and process evaluations.

The overall goal of the impact evaluation will be to develop savings methodologies for estimating savings from more stringent code adoption and increased code compliance rates in both the residential and commercial sectors.

Process related evaluation activities will review AEP Ohio energy code promotion implementation strategies and seek to identify ways to improve program delivery and market adoption of more aggressive residential and commercial codes. Self-report surveys with key stakeholders (code officials, builders, architects, etc.) as well as on-site verification of a sample of new construction projects will be used to assess program awareness, barriers to participation, participant satisfaction, and other process efficiency issues. Interviews also will be conducted with EE/PDR program managers and the implementation contractor. These surveys will be enhanced by collecting market data and assessing market trends. Wherever it is practical and appropriate, evaluation activities will be conducted in conjunction with other utilities and agencies in the state to efficiently utilize resources and help ensure consistency.

AEP Ohio Administrative Requirements

AEP Ohio staff will be responsible for administering the program. Staff required to implement the program include one-quarter of a full-time-equivalent (FTE) staff person at a middle management level, and one-quarter FTE junior staff person. Responsibilities for these staff will include coordination, planning and implementation of all program activities. Evaluation activities would be conducted by a third-party contractor.

Savings Targets

Energy savings from the program will be determined after the impact evaluation is approved and completed. The overall goal of the impact evaluation will be to develop savings methodologies for estimating savings from more stringent code adoption and/or

increased code compliance rates in both the residential and commercial sectors.

A calculation methodology to apportion energy savings attribution from energy codes will be developed and approved by the PUCO. The current statewide energy code in Ohio, the 2006 International Energy Conservation Code (IECC) adopted January 1, 2009, will be used as the baseline.

Quality Assurance and Control

- The Codes and Standards Support Program will seek to be an additional informational resource for code officials, architects, builders, and other stakeholders to obtain technical guidance with respect to code adoption and compliance activities.
- AEP Ohio staff will seek to further strengthen existing contacts with code officials, builders, and architects to advance code upgrades and code compliance. This will include occasional on-site verification visits, especially for those projects receiving utility incentives for efficiency upgrades.
- Participant satisfaction surveys will be issued as a standard feature of any AEP Ohio-sponsored energy code training classes.

The program evaluation process (described above) will provide an additional level of quality assurance for the program

4.3.4 Transmission and Distribution (T&D) and Internal System Efficiency Improvements

Program	T&D and Internal System Efficiency Improvements
Objective	<p>AEP Ohio Transmission and Distribution projects are funded through FERC and PUCO approved rates and no cost recovery is proposed under the EE/PDR rider in this Plan. The program is listed here to note that any peak demand reduction and energy efficiency savings results from AEP Ohio efforts to improve the efficiency of its transmission and distribution facilities will be reported toward AEP Ohio's EE/PDR achievements during the respective year in which those results occur as part of its overall compliance strategy. EE/PDR savings will be reported in AEP Ohio's annual Plan status report.</p>
Program Description	<p>A core responsibility of each utility is to deliver service voltage within a suitable range; this is done by regulating the voltage and maintaining voltage in an acceptable range for proper operation of customer equipment. (The service voltage is the point where the utility and the end user are interconnected. This is usually the electric meter.) The suitable range for delivered voltage is determined by The ANSI Standard C84.1.</p> <p>Conservation voltage reduction (CVR) is a reduction of energy consumption resulting from a reduction of feeder voltage.</p> <p>Potential ancillary benefits:</p> <ul style="list-style-type: none"> • Available to every utility. • Much of the potential requires very little improvement in infrastructure. • Helps meet conservation needs/requirements. • Improves load factor. • Increased awareness and knowledge of the system leads to better planning. <p>The operation of a T&D power system includes a loss of the portion of the power being transmitted due to the electrical resistance of the power system elements (conductors, transformers and regulators). The transmission of power at different voltage levels throughout the power system yields different losses during the delivery of Power. The farther the delivery through the system from the generation point, the greater the loss component associated with the transfer through the voltage transformations.</p> <p>There are various system improvements that, if made, will reduce the T&D losses, including:</p> <ul style="list-style-type: none"> • Re-conductoring of lines, substation improvements, the addition of capacitor

banks, the replacement of regulators and the installation of Volt/VAR devices.

- Re-conductoring projects involve the replacement of existing wires with larger wires and wires designed for lower losses at transmission and distribution voltages. Re-conductoring projects reduce line losses by lowering the resistance of the system through which energy is provided, such that the power lost during transmission is lowered.
- Substation projects typically include connecting previously unconnected T&D lines, and/or the addition or upgrade of transformers and circuits in new or existing locations. These projects can improve efficiency and reduce line losses by providing additional transformation points closer to customers' loads. As a result, a greater portion of the energy is transmitted in the lower resistance transmission lines instead of the higher resistance distribution lines.
- Capacitor bank projects include the addition or expansion of capacitor banks at substations. These projects reduce line losses by placing reactive sources near load centers. Capacitors reduce the reactive load traveling across the power system and reduce line losses.
- Distribution voltage regulation projects involve the replacement of existing equipment with larger and/or more efficient equipment. These projects reduce the losses and heating associated with smaller equipment. The upgraded system transfers energy more efficiently to the customer.
- Another area for energy efficiency improvements in the T&D area includes improvements to the energy performance of company buildings that are located in AEP Ohio's service area.

4.3.5 Business Behavior Change

Program	Business Behavior Change Program
Objective	<p>Investigate energy savings for all business customers implementing energy use behavior programs. The pilot focuses on quantifying savings for various business energy users utilizing different energy education and social marketing techniques. There are two primary objectives for the program:</p> <ul style="list-style-type: none"> • Investigate possible behavioral energy efficiency strategies. • Illustrate an effective methodology for quantifying energy savings when implementing a behavioral program.
Target Market	<p>Generally, the program is designed to incentivize larger commercial buildings, offices, retail locations and schools with energy management systems to analyze energy usage. Proactive outreach efforts will utilize a targeted strategy to influence specific market participants.</p>
Program Duration	<p>The Business Behavioral Pilot will be a three-year effort to be reviewed annually.</p>
Program Description	<p>Behavioral programs utilize various techniques to educate and influence individual and business attitudes and behaviors that effect energy usage. The program structure is intended to build awareness of energy use in normal operating processes and encourage a reduction in usage without replacing installed building technologies, such as HVAC and lighting equipment. End results include influencing business customers to add an energy management best practice.</p> <p>A primary element to the success of this pilot includes illustrating quantifiable savings, and the potential of future savings. Central to this objective is the utilization of Energy Management Systems (EMS). Pilot program benchmarking may require the installation and adoption of EMS by business energy users.</p> <p>Possible motivational strategies include:</p> <ul style="list-style-type: none"> • Workplace/employee conservation campaigns can foster teamwork and cooperation throughout a company to promote energy savings. Successful examples include: <u>BC Hydro's Workplace Conservation Awareness Program</u> http://www.bchydro.com/powersmart/commercial/workplace_conservation_awareness.html <u>Flex Your Power's Commercial Office Building Best Practice Guide</u> http://www.fypower.org/com/bpg/

- **Competitions** and rivalries are useful tools to gain office participation. Office groups or energy saving teams compete to save energy during normal business operation and can initiate an energy awareness and a reduction in energy consumption. The strategy takes advantage of positive social marketing. Examples include:

[Kilowatt Crackdown](http://www.kwcrackdown.com/) (<http://www.kwcrackdown.com/>)

[Cool School Challenge](http://www.coolschoolchallenge.org/) (<http://www.coolschoolchallenge.org/>)

[Watts to Water](http://www.wattstowater.com/what-is-it.php) (<http://www.wattstowater.com/what-is-it.php>)

- **Energy education and building operator certification programs** provide building owners and operators training needed to be energy conscience. These programs offer training, events, and certifications to promote growth and understanding of energy efficiency strategies. Strategies of this pilot to include continuation and growth of existing AEP Ohio measures focused on certification programs. Examples include:

[MEEA Building Operator Certification](http://www.boccentral.org/index.php) (<http://www.boccentral.org/index.php>)

AEP Ohio may elect to put this pilot out to bid for implementation and/or run activities in house.

Incentive Strategy

The Business Behavioral Pilot relies on low to no cost behavioral adaptations and therefore it is anticipated that no incentives or modest direct financial incentives will be used. Estimated savings and incentive levels will be established based on the type of program implemented, cost of implementation, and participation levels. Positive business publicity and employee enthusiasm will enhance participation.

Eligible Measures

The Business Behavioral Pilot target measures are essentially building operating habits of the building occupants as a result of a company culture shift toward energy efficiency.

Implementation Strategy

TBD

Marketing Strategy

TBD

Milestones

Tasks	Timeframe
Selection of Pilot Implementation Contractor(s)	3 - 6 month
Program materials developed	6 - 9 months
Pilots) launch – marketing begins	9 - 12 months

EM&V Strategy

Installation and adoption of EMS will be a focal point to insure consistent measurement and verification of individual pilot program measures.

All evaluation activities will be conducted by a third-party evaluation contractor. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.

- The overall goal of the impact evaluation will be to validate/calibrate the savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.
- The process evaluation will 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.

AEP Ohio Administrative Requirements

AEP Ohio will be responsible for general administrative oversight of the program Plan. It is estimated that a 0.5 full-time equivalent (FTE) will be required for program oversight. Key oversight functions include:

- Recruitment, selection, and management of an implementation support 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 education and training
- Data warehousing.
- Management of the evaluation contractor.
- Goal achievement within budget.

AEP Ohio and its implementation contractor(s) will follow industry best practices during final program design and start-up to ensure success, including:

- Assessing current market conditions for energy efficiency product.

availability and pricing.

- AEP Ohio Account Manager and customer service training.
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch.
- Preparing for stronger or weaker than expected participant response.

4.3.6 gridSMART® Demonstration Project EE/PDR Savings

Program Objective	gridSMART Demonstration Project EE/PDR Savings
<p>The gridSMART Demonstration project is funded under a separate rider and no cost recovery is proposed under the EE/PDR rider. The project is listed here to note that any peak demand reduction and energy efficiency savings results from this effort will be reported toward AEP Ohio's EE/PDR achievements during the respective year in which those results occur.</p>	
Program Description	
<p>The current programs that could produce reportable savings include programs designed to reduce the growing demand for electricity, especially at times when demand is high:</p> <ul style="list-style-type: none"> • Energy Reports, Energy Portal, In Home Displays, Programmable Communicating Thermostats – Programs/Equipment designed to produce energy and demand savings through greater access to energy information and the technology to manage energy use • Smart Shift - A two tier time-of-day program that rewards customers to use electricity during off peak hours. • Smart Shift Plus - A three tier time-of-day program with critical peak pricing events (maximum 15 events a year with 10 additional emergency events). • Smart Cooling - This program is designed to adjust the thermostat up to 4 degrees and no more than 6 hours per event during high demand hours. (maximum 15 events during summer with 10 additional emergency events). • Smart Cooling Plus - This program uses a load control switch to turn off the customer's electric water heater, pool pump and/or hot tub during high demand hours. (maximum 15 events during summer with 10 additional emergency events). • Smart Choice (has not been approved by the commission) - This program is designed to give customers options in how they choose to manage their demand. • Volt/VAR Control (VVC) - End-of-line monitoring allows the utility to determine where AEP can maintain the voltage on the circuit through automating regulators and capacitors to reduce energy consumption and peak demand. In addition, it helps maintain unity power factor. • Community Energy Storage - Each CES unit can provide up to 25 kVA of backup power to 2-5 homes. The additional benefit includes peak shaving and VAR support to the distribution system. • Smart Appliance - Each appliance will respond to pricing events. The appliances will either not run or run in an energy saver mode during high and critical peak pricing events. 	

4.3.7 Customer Power System Efficiency

Program	Customer Power System Efficiency Program
Objective	Power System Efficiency Program provides customers with specific technology measures that can be implemented to improve power quality and to produce energy and demand savings within the customers' facilities or the AEP Ohio Distribution System.
Target Market	<p>Harmonic Distribution Transformer and Filters – large multi-storied office buildings.</p> <p>Power Factor Correction – large industrial customers (>700,000 kWh/12 month average) with process equipment.</p> <p>Volt/VAR Systems – industrial customers with motors, drives, transformers and lighting.</p>
Program Duration	3 Years
Program Description	<p>Harmonic Distribution Transformers and Filters - Office building electric systems prior to early 1980's were not designed for the plug loads and lighting systems that exist today. Increased harmonic distortion from fluorescent lighting, fax machines, copiers, printers and computers are common today. Many of these devices are operating a high percentage of the time, increasing the demand factor and maximum load as a percentage of connected loads. The mitigation of harmonics by filters and transformer design increases transformers and building system efficiency.</p> <p>Power Factor Correction – Certain production intensive Manufacturing Industries have production equipment and facilities that contribute to low power factors that affect their equipment and reflect losses back to the Distribution system limiting the ability to use this energy for useful purposes. The power factor correction at the customer delivery point does not provide energy savings to the customer.</p> <p>Volt/VAR - Energy efficiency can be gained by optimizing industrial plant distribution voltages. Operating electric distribution systems in the lower half of the ANSI allowable levels improves the efficiency of most utilization devices. When motors, drives, electronically switched power supplies, transformers and lighting are applied properly, they will operate more efficiently in the lower end of their voltage range.</p> <p>Production equipment and facilities operated at the higher end on the voltage levels contribute to low power factors that affect their equipment and reflect losses back to the Distribution system limiting the ability to use this energy for useful purposes. The Volt/VAR system dynamically regulates the supply voltage reducing consumed energy and also provides customer power factor correction by reducing VARs for better facility operation.</p>

Incentive Strategy

Harmonic Distribution Transformers and Filters - incentives will be paid at \$0.08/first year kWh savings and \$100/kW on-peak. Additional incentives can be paid by the new construction program to designer and owner if this measure leads to higher building efficiency under the whole building design approach.

Power Factor Correction – Power factor correction at the customer delivery point does not provide energy savings to the customer, but does provide AEP Ohio System savings. Incentives will be paid at \$0.08/first year kWh savings and \$100/kW on-peak.

Volt/VAR - incentives will be paid at \$0.08/first year kWh savings and \$100/kW on-peak.

Eligible Measures

Harmonic Distribution Transformers and Filters
Power Factor Correction Capacitors
Volt/VAR Systems

Implementation Strategy

AEP Ohio Program management and program placement with the external Implementation Contractor that has the Custom and New Construction Programs.

Marketing Strategy

Harmonic Distribution Transformers and Filters - Marketing will be to existing building owners and Architect/Engineers directly and through associations, solution providers and outreach. A case study describing the pilot project efficiency will be used to communicate the concepts with this measure. This will be marketed as a measure that can get additional whole building incentives for designer and owner and will highlight the savings, which can be measureable and meaningful in achieving LEED certification.

Power Factor Correction Capacitors - The marketing of this measure is by email and direct communication to the customer and solution provider classifications, which are typically managed accounts, and through their industry associations.

Volt/VAR Systems – This technology will be marketed to large industrial customers and institutions (colleges and universities) by email and direct communications including paper and case studies to better explain the technologies' potentials.

Milestones

Pilot Harmonic Distribution Transformers and Pilot Power Factor Correction to be evaluated in 2011. The Volt/VAR is being evaluated on the AEP system for Distribution System Energy Efficiency prior to customer implementation.

EM&V Strategy

Harmonic Distribution Transformers and Filters – Pre and post metering.

Power Factor Correction Capacitors – Pre and post metering to determine power factor values for evaluation with deemed values. The Commission has indicated that a simplified methodology (deemed value) for capacitors has some merit and that setting a standard ratio of energy savings per kVAR of capacitance does not appear feasible,

since energy savings depends on the line loading in kVA (which depends on kW and kVAR loads). It also is required that the methodology be consistent with the Protocol formulas in the Ohio TRM.

For Power factor capacitors added at distribution voltages: $kW = kV \times I \times pf$, so the initial current (I_i) before power factor correction is $I_i = kW / (kV \times pf_i)$, after capacitors are added kW does not change and the final current (I_f) is $I_f = kW / (kV \times pf_f)$. The reduced current (I_r) is $I_r = I_i - I_f$. The base kW saved is $I^2 R$.

Following the Commission's recommendation, the deemed value for R is the resistance of typical conductor used to connect large industrial facilities with the high kW usage multiplied by the typical distance from the substation to customer connection point. The final system loss reduction = base kW loss x average loss factor (used in T&D loss studies) x 8760 (for fixed power factor correction capacitors), or base kW loss x average loss factor (used in T&D studies) x hours of operation (for switched power factor correction capacitors).

The above approach is not practical for supply at transmission voltages as a customer transformer is involved and deemed values for transmission are not practical. For transmission supply, an area loss saving calculation will be run for the AEP Ohio system based on existing transmission models and load flow studies, which follow the Ohio TRM.

4.3.8 Research and Development

Objective	Research and Development
<p>In the 2009-2011 EE/PDR Action Plan, this activity was handled under the Pilot program. An expansion of the structure of this program is necessary to provide more robust and rigorous support for the strategic and tactical planning process. Key objectives:</p> <ul style="list-style-type: none"> • Provide support to the implementation team for testing and making mid-stream adjustments to the current Plan as needed. • Prepare for the new and modified cost effective programs needed to achieve EE/PDR targets in future plans. • Support market transformation. 	
Description	
<p>AEP Ohio believes that a targeted focus on moving new and innovative technologies, program concepts and marketing techniques more quickly into the marketplace plays a critical role in the EE/PDR Plan. AEP Ohio will manage a research and development (R&D) structure, which includes identifying key emerging technologies and program concepts, and designing and executing research or pilot projects to test the feasibility for inclusion in the Plan.</p> <p>R&D efforts will build upon AEP Ohio’s existing, successful Plan, while expanding the reach to address continually changing market environments. AEP Ohio intends to monitor the energy efficiency landscape and identify opportunities when they arise. AEP Ohio also intends to monitor research at the national level. The investment into new concepts in energy efficiency is critical to the future success of the EE/PDR Plan.</p> <p>The identification and analysis of new concepts – whether technological or behavioral in nature or new delivery mechanisms – is an important component of AEP Ohio’s ability to achieve significant energy savings now and in the future. AEP Ohio proposes that any kWh savings realized from these pilot activities count towards the annual kWh goal. AEP Ohio also intends to collaborate with the AEP Ohio Collaborative on the new concepts for consideration.</p> <p>Within this plan, AEP Ohio does not attempt to identify every project that could potentially be funded over the course of the Plan. Instead, AEP Ohio intends to continually monitor the energy efficiency space and identify opportunities when they arrive in partnership with the AEP Ohio Collaborative.</p> <p>As AEP Ohio’s EE/PDR goals become more aggressive and the “low-hanging fruit” is captured, it is important that AEP Ohio develop and deploy new technologies and delivery models for capturing remaining efficiency potential. AEP Ohio believes that it is essential that the EE/PDR Plan evolve over time. Whether through new technologies,</p>	

new delivery mechanisms, new program types or targeted customer segments, it is important that these concepts are properly investigated and analyzed to determine their potential viability and value to the Plan.

Implementation Strategy

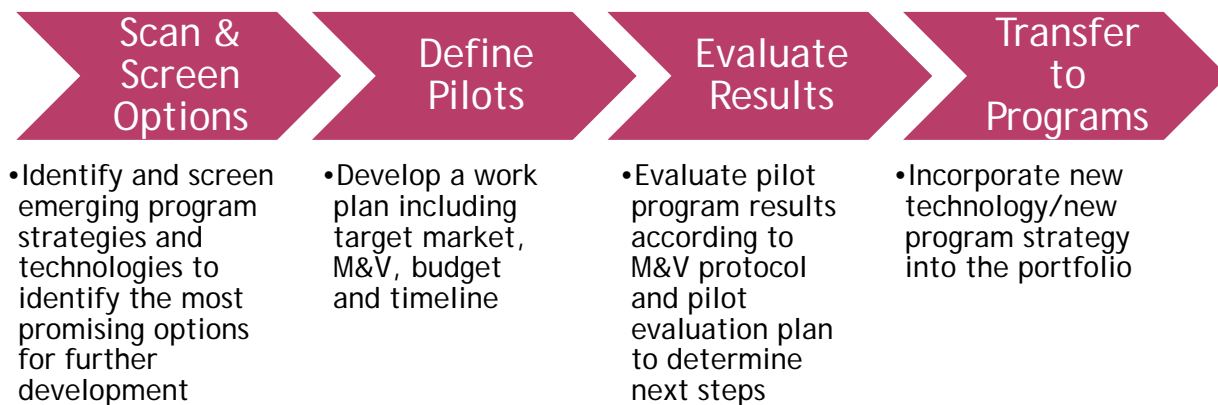
For this Plan, AEP Ohio intends to implement a process that identifies opportunities within the Plan and researches potential responses to these opportunities. Additionally, AEP Ohio proposes that all pilot projects be evaluated for kWh savings such that those savings can be applied to the annual kWh goal.

Screening Process:

While AEP Ohio achieved much in terms of kWh savings during the first Plan, the R&D process was more reactive than proactive, as AEP Ohio tended to address opportunities and issues as they presented themselves. In early 2011, AEP Ohio undertook a proven process for screening and prioritizing emerging technologies and program strategies that will provide EE/PDR benefits to AEP Ohio's customers. AEP Ohio will continuously update the screening process with new technologies and marketing and program strategies to ensure a continuous comprehensive scan and prioritization effort.

Figure 15 below provides a high level overview of the pilot screening process.

Figure 15. Pilot Screening Process



Scan & Screen Options: In this initial screen, AEP Ohio identifies and screens emerging program strategies and technologies to identify the most promising options for further development. This involves reviewing other utility programs, contacting various associations and communicating with key stakeholders.

Through this initial research, AEP Ohio identifies potential EE/PDR measures and program approaches to pilot based on the following:

- Suitability: whether or not the program is a good fit for AEP Ohio
- Savings potential: expected savings

- Validation: level of questions around other utility pilots

After the initial screen, the remaining technologies/programs are screened through a more detailed assessment and include the following considerations:

- Market opportunity
- Initial savings potentials (technical and market)
- Estimated cost
- Risks and barriers (technical and market)
- Proposed intervention strategies to address barriers and capture opportunities
- Customer participation: potential number of customers, projected receptiveness
- Non-energy benefits (e.g., improved performance, water efficiency)

The preliminary results of this assessment screen allow AEP Ohio to determine whether any additional research is necessary before deciding which pilots to implement. Once the decision has been made to pilot a program strategy/technology, a preliminary pilot implementation strategy is developed.

Define Pilots: Once a pilot program strategy/technology has been identified, AEP Ohio develops a preliminary pilot implementation strategy, including the following elements:

- Key progress indicators and milestones
- Reporting or tracking
- Evaluation strategy
- Project budget and timeline

Evaluate Results: The ultimate objective of evaluating program results is to determine whether the emerging technology or program strategy is suitable for inclusion in AEP Ohio's Plan of programs. Steps include:

- Monitor pilot program
- Collect data
- Analyze data (energy savings, penetration, target markets)
- Determine next step which may be to move the technology to a program, conduct more testing, discard the program or put on a "watch list"

Transfer to Programs: Assuming pilot program success, AEP Ohio will determine whether or not the technology should be a new measure within an existing program or an entirely new program. Upon determination, AEP Ohio incorporates the new technology/program strategy into the Plan through the identification of target markets

and channels, determination of incentive levels and definition of the value proposition.

Pilot Program/Emerging Technology Program Guidelines

Based on the process described above, AEP Ohio has developed a set of guidelines to follow for each pilot program. These guidelines help address fundamental questions about the pilot program and clarify desired pilot objectives and outcomes. These steps are crucial to developing the most appropriate pilot program design prior to implementation. Without ensuring the best program design for producing needed outcomes, it will be difficult to evaluate programs for potential inclusion in the Plan.

To develop the guidelines, AEP Ohio researched work that has been done in California and developed in response to a California Public Utility Commission (CPUC) ruling (08-07-021). The CPUC ruled that each proposed pilot program summary should contain certain elements.

AEP Ohio reviewed those elements and structured the following program guidelines within each potential pilot program plan:

- Market opportunity (description of program or technology).
- A specific statement of the concern, gap or problem that the pilot seeks to address and the likelihood that the issue can be addressed cost effectively through utility programs.
- Whether and how the pilot will address a long term strategic goal or strategy and support market transformation.
- Specific goals, objectives and end points for the project.
- New and innovative design, partnerships, concepts or measure mixes that have not been tested or deployed.
- A clear budget and timeframe to complete the project and obtain results within a the three year Plan cycle.
- Information on relevant baseline metrics or a plan to develop baseline information.
- Program performance metrics (achievements you want to meet).
- Methodologies to test the cost effectiveness of the project.
- A proposed EM&V plan.
- A concrete strategy to identify and disseminate best practices and lessons learned from the pilot and to potentially transfer those practices to resource programs.

Planned R&D Programs	
AEP Ohio is undertaking or planning R&D and/or implementing pilot programs for the following technologies/programs. Some planned programs have been fully developed as shown in this section, such as the Agricultural Energy Efficiency Pilot, while others require additional R&D prior to launch.	
Program Objective	Agricultural Pilot Program
The Agricultural Pilot's objective is to bring energy savings and demand reduction to the specialized needs of the agricultural sector by offering facility audits, installation support services, and financial incentives for the installation of energy efficient measures to qualifying AEP Ohio customers.	
Target Market	
The Agricultural Pilot will target agriculture farms that produce livestock, dairy and/or edible crops in AEP Ohio's service territory. The program also will also closely with the extended agricultural community, comprised of leaders in organizations such as the Ohio Farm Bureau, Extension Service, United States Department of Agriculture's (USDA) Natural Resources Conservation Services (NRCS), conservation districts, and commodity organizations.	
Program Duration	
The Agricultural Pilot will be a three-year effort to be reviewed annually.	
Program Description	
<p>The Agricultural Pilot will deliver reliable and persistent electric savings and demand reduction by offering facility audits, installation support services, prescriptive rebates on agriculture lighting and financial incentives for the installation of energy efficiency measures to qualifying customers served by AEP Ohio throughout its service territory. An important criterion for achieving broader energy efficiency in the agricultural sector is elevating energy as a business priority. The pilot will help demonstrate how energy efficiency contributes to increased competitiveness and/or profitability while promoting compliance with environmental requirements through successful implementation of the program measures.</p> <p>For optimal effectiveness, the program may include:</p> <ul style="list-style-type: none"> • Energy efficiency education for manufacturers, equipment dealers, the extended agricultural community, and AEP Ohio farm customers. • Assistance identifying additional funding sources, such as water conservation funding, federal tax credits, Farm Bill programs, and others. 	
Incentive Strategy	
Incentives will be paid to participants based on AEP Ohio's deemed savings and calculated incentive options. In addition to the customer incentives, the pilot also may offer an incentive to equipment dealers who install qualifying equipment.	

Eligible Measures

Efficiency measures may include:

Lighting Equipment and Controls

- T-8 or T-5 lamp, electronic ballast
- LED exterior lighting
- Interior high bay linear fluorescent
- Photocells and time clock installations
- Occupancy and/or daylight control of lighting

Heating Ventilation and Air Conditioning (HVAC)

- Ventilation fans and box fans
- High thermal efficiencies of heating equipment
- Mechanically efficient air conditioning with economizers
- Heat recovery
- Setback controls
- Insulation and air sealing

Refrigeration and Controls

- Milk plate-type pre-coolers
- Milk transfer using a variable speed drive to regulate flow through plate-cooler
- Variable speed drives on vacuum pumps
- Compressor Heat Recovery units for pre-heating hot water
- Efficient compressors for bulk tanks
- Efficient evaporator fans and controls
- Defrost control for freezers
- Refrigeration economizers

Compressed Air (facilities with greater than a total of 25 HP of compressed air)

- Leak detection and elimination
- Variable speed drive compressors
- Air receivers for modulating compressors
- Cycling air dryers
- Venturi hand-gun nozzles
- Controls upgrades

Other

- Premium efficiency motors
- Storage water heater retrofits
- Irrigation projects
- Facility audits

Implementation Strategy

The Agricultural Pilot will offer agriculture energy audits over the program period with the cost shared by AEP Ohio and the customer. If the customer installs a significant

portion of the recommended measures identified in the audit, AEP Ohio will cover the full audit cost. This cost share will ensure customers have a vested interest in carrying out audit findings.

An audit data collector from AEP Ohio's implementation contractor will visit farms to collect information through onsite energy audits. The implementation contractor then will process the energy audit recommendations and reported. Each audit will be delivered to the farmer and reviewed in detail to ensure the farmer is adequately informed about the energy savings opportunities and how to receive rebates for recommended equipment upgrades.

The implementation contractor will offer rebates to farmers for installations of energy efficient equipment. Where applicable, these rebates will be consistent with AEP Ohio's existing rebates for the same technology.

Farmers can enter the pilot through two tracks: the audit track or the measure installation track. Some farmers are already aware of a technology they wish to replace or add, while others may need assistance in determining which technology will work best.

Likewise, farmers also may enter the pilot by requesting an energy audit. If they qualify to receive an audit, the implementation contractor will perform the audit and then follow up with the customer to ensure they follow through with the recommendations.

This two-track enrollment approach is respectful of those farmers who already may know they need to install a particular type of equipment. This approach also will lead to more installations (thus a more comprehensive approach), because farmers will be more likely to install equipment when they are encouraged to do so throughout the entire pilot cycle.

Along with the rebate check, the implementation contractor will include a survey to gauge the customer's satisfaction and provide a means to make pilot enhancements and adjustments based on feedback. Results of the customer satisfaction survey will be reported to AEP Ohio on a quarterly basis.

Marketing Strategy

The Agricultural Pilot will be delivered through a comprehensive marketing approach incorporating upstream (equipment manufacturers), midstream (equipment dealers) and downstream (customers) market actors. The pilot also will work closely with the extended agricultural community, comprised of leaders in organizations such as the Ohio Farm Bureau, Extension Service, USDA's NRCS, conservation districts, and commodity organizations.

As part of the marketing strategy, the implementation contractor will recruit organizations that have special knowledge and experience and different links to AEP

Ohio customers. The strategy will include the following elements:

- Continuing to approach the manufacturers of equipment promoted through the program and enlisting their support in identifying their network of dealers and distributors. The implementation contractor also will find out how manufacturers market their products, which will help to better target the messages to midstream and downstream market actors.
- Continuing to build and strengthen relationships with the identified dealer network to educate them about the customer rebates available and to ensure they know what equipment is eligible. The implementation contractor also will ensure dealers are aware of the midstream incentive available to them and the requirements for receiving an incentive.
- Building the implementation contractor's existing partnerships with Ohio's agricultural community, comprised of organizations such as the Ohio Farm Bureau, USDA, conservation districts, resource conservation and development councils, and other organizations actively involved in supporting Ohio agriculture.
- Continuing to work proactively with AEP Ohio's Account Managers and other EE/PDR Program Coordinators to help generate customer leads for the pilot.

Concurrent to notifying manufacturers, dealers, and the agricultural community of the program, the implementation contractor will deliver an aggressive marketing campaign to engage AEP Ohio's livestock, dairy and other agricultural costumers. This outreach process ensures when the producer hears about the program from the implementation contractor, the information has already been received by the community network they know and trust.

EM&V Strategy

All evaluation activities will be conducted by a third-party contractor selected through a competitive bidding process. An integrated evaluation approach will 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, as well as conducting primary and secondary research as part of impact and process evaluations.

- The overall goal of the impact evaluation will be to validate/calibrate the deemed savings values and determine program cost-effectiveness. Self-report surveys with both participants and nonparticipants may be used to assess free riders/spillover. The participant and nonparticipant surveys will also address program awareness, barriers to participation, participant satisfaction, and process efficiency. These surveys will be enhanced by collecting market data and assessing trends as well as interviews with program staff, vendors, manufacturers, and other Solution Providers.
- The process evaluation will 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.

AEP Ohio Administrative Requirements

AEP Ohio will be responsible for general administrative oversight of the program Plan. It is estimated that a 0.5 full-time equivalent (FTE) will be required for program oversight. Key oversight functions include:

- Recruitment, selection, and management of an implementation support 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.

AEP Ohio and its implementation contractor(s) will follow industry best practices during final program design and start-up to ensure success, including:

- Assessing current market conditions for energy efficiency product availability and pricing.
- AEP Ohio Account Manager and customer service training.
- Completing all program procedures from marketing through verification and payment and conducting a dry-run prior to launch.
- Preparing for stronger or weaker than expected participant response.

The following planned programs require additional R&D prior to full scale launch:

Phantom Power/Plug Load/Cable Boxes: Phantom power, also known as standby power or vampire power, is defined by LBNL as “electricity that is consumed by appliances and equipment while they are switched off or not performing their primary function (but are still plugged in).” This is an attractive source of conservation potential since its curtailment should not impose a significant opportunity cost on customers, since by definition, the device being curtailed is not being used.

AEP Ohio’s Phantom Power Pilot Program goals are to assess how well AEP Ohio customers understand what phantom power is, what mitigation strategies may be used, and to estimate the conservation potential and cost-effectiveness of a number of different marketing strategies for reducing phantom power consumption in AEP Ohio’s service territory. To achieve these goals, AEP Ohio will determine what marketing approach leads to the highest market penetration of smart strips and what marketing approach produces the highest level of phantom power reduction per household.

AEP Ohio will also investigate energy efficiency opportunities in the consumer electronics area. Conventional wisdom holds that home electronics and other such plug-load devices are a significant and growing part of electricity consumption in an increasingly connected and gadget-hungry society. Consumer electronics, office equipment and other plug loads consume 15 to 20 percent of total residential and commercial electricity in the United States. Much of this energy is consumed when these devices operate in low-power modes but are not actually in use.

Residential Heat Pump Water Heaters: The purpose of the heat pump water heater (HPWH) pilot is to inform the design and development of a conservation program to affect the purchase and installation of heat pump water heaters that incorporates a combination of market push and pull strategies. AEP Ohio seeks to determine the level of awareness of HPWHs and determine the best delivery channel to increase the penetration of HPWHs in the service territory. This will be answered through a combination of quantitative and qualitative analysis of marketing approaches, each corresponding to a different treatment group. The evaluation of the HPWH pilot will primarily be a process evaluation with results obtained from interviews with program managers, implementation contractors and potential participating retailers to assess the operational conditions of the program and to identify ways to improve the program.

CFL Fundraiser with a Twist: The CFL Fundraiser with a Twist Pilot Program provides schools, clubs or other non-profit organizations within AEP Ohio’s service territory the opportunity to raise money for their organization through a CFL bulb direct install program.

Participating organizations receive \$0.50 for each working incandescent bulb they

replace with an ENERGY STAR® qualified CFL in homes and facilities that serve elderly, infirmed or low-income customers. The organization distributes up to 12 CFL bulbs per home, choosing from 23-watt (100 watt incandescent equivalent) and 13-watt bulbs (60-watt incandescent equivalent). The 23-watt bulbs are typically used for reading and task lighting. The 13-watt bulbs are for general lighting use.

Energy Check Toolkit Library Lending Program: The Energy Check Toolkit Library Lending Program is an education program designed to build customer awareness on how much electricity common household items may be using. Kill-A-Watt™ meters supplied to libraries within AEP Ohio's Ohio service territory can be checked out to library patrons free of charge through the normal audio-visual check-out process. Educational material included with each meter covers general meter instructions, AEP Ohio's Consumer EE/PDR programs and an introduction to phantom load and simple actions that can be taken to reduce plug load. Customers are also asked to complete a survey after they turn in the meters.

The meters are packaged in kits, each of which include an operations manual and a worksheet to help users calculate energy costs associated with household electrical appliances. Additional printed resources include information about AEP Ohio's Consumer EE/PDR program and an introduction to phantom load and simple actions that can be taken to reduce or eliminate the phantom load. The meter can be "checked out" for a time period specified by the participating library. If a meter is not available at a desired time, the borrower may reserve a meter for checkout once it becomes available again – just like any audio-visual materials.

Commercial/Industrial Energy Audits: AEP Ohio's Commercial/Industrial (C/I) Energy Audit Pilot Program is a program in which AEP Ohio offers financial assistance for energy efficiency audits under the AEP Ohio Business Incentives program. AEP Ohio provides incentives for energy audits to non-residential (commercial and industrial) customers to help them make informed electrical energy decisions and implement energy-efficiency strategies. Energy audits provide outreach and help identify economically viable improvements that yield annual energy savings by participating in the AEP Ohio Business incentives program.

AEP Ohio began implementing the C/I Audit Pilot Program in early 2011 and plans to continue testing the program through this planning cycle.

Schools Partnership Program: AEP Ohio plans to evaluate programs that provide viable energy efficiency and demand reduction solutions for school districts and higher education institutions. The program will be designed to address and overcome key barriers that prevent the schools segment from taking full advantage of energy efficiency opportunities. These barriers include chronic budget constraints; de-centralized decision-making authority; outdated specifications; limited technical knowledge; lack of senior management support; counterproductive energy budgeting; and a lack of commitment to proper building commissioning and retro-commissioning.

To overcome these barriers, AEP Ohio will develop an energy improvement process which may include benchmarking energy use, developing an energy plan, partnering with a variety of different energy efficiency service providers, providing technical support and providing financial incentives.

Governmental Partnerships: AEP Ohio will work closely with the state of Ohio and local municipalities to explore opportunities for significant energy savings. AEP Ohio believes engaging the state, cities and towns in energy efficiency will build stronger and more effective partnerships that will ultimately result in greater energy savings using a broader approach. Through these partnerships, AEP Ohio will be able to deliver Business programs cost-effectively, and help develop deeper energy savings in the significant number of governmental buildings located in AEP Ohio service territory, potentially linking AEP Ohio programs to community-based sustainability efforts, potentially recruit hard-to-reach populations and successfully effect market transformation within Ohio's communities.

Energy efficiency in buildings is a key opportunity in this segment and developing partnerships with the governmental entities and energy efficiency services providers is crucial to gaining deep energy savings. Traditionally, utility incentive programs haven't always worked seamlessly with all energy efficiency service providers, and this pilot is intended to explore win-win-win opportunities for customers, AEP Ohio and a variety of service providers working in this segment.

In addition, AEP Ohio will work with municipalities to encourage early adopters in newer, near proven, technologies. Pilot funding will be made available to the City of Hilliard and Groveport for municipally owned Light Emitting Diode (LED) street lighting and municipally owned LED traffic signal conversions in the amount of up to \$100,000 for each municipality, not including regular incentives, for installations during the term of this Plan. This funding will assist in testing this technology further and the cities will provide research to AEP Ohio on marketing, operational and technical issues related to LED installations. Compared with existing mercury vapor bulbs, LED lights produce a comparable amount of light with an average 66 percent savings in energy use or watts. In addition, LEDs are extremely long-lasting. An LED lamp has a potential lifespan of up to 25 years, compared to 5-7 years for traditional street light lamps. Towns switching to LED streetlights will reduce light pollution and glare while saving money and electricity. This is because LEDs can be more precisely directed to illuminate only the desired areas, such as streets, walkways and parking lots.

Model Home: The cost effectiveness of residential EE/PDR programs is becoming more difficult to achieve and deeper energy savings beyond CFLs are needed. AEP Ohio intends to investigate the development of a model home to analyze actual best practice building techniques, energy efficient technologies and operational strategies to develop new home construction and home retrofit strategies to maximize energy savings and cost effectiveness in those programs. The model home should also be used to help promote any new strategies, technologies, construction or operational

opportunities developed.

ENERGY STAR Portfolio Manager: Portfolio Manager is an interactive, online energy management tool developed by the U.S. Environmental Protection Agency that calculates the economic benefits of using various ENERGY STAR energy efficient measures. The online tool allows you to track and assess energy and water consumption within individual buildings as well as across an entire portfolio of buildings in a secure online environment. Portfolio Manager can help set investment priorities, identify under-performing buildings, verify efficiency improvements and receive EPA recognition for superior energy performance.

AEP Ohio has agreed to support the State of Ohio on a Federal grant request to develop Portfolio Manager Scores for customers throughout AEP Ohio's service territory, but will also pursue scoring buildings regardless to set benchmarks for energy efficiency improvement, creating a competitive environment for energy efficiency improvements in various customer segments.

Energy Efficiency Financing and Funding: AEP Ohio plans to work with providers of financing to encourage financing and alternative funding mechanisms to support capital investment in EE/PDR. In addition, AEP Ohio hopes to work collaboratively with customers to tie their sustainability activities and emission reduction activities to energy efficiency and increase the total available funding for investment. Also, AEP Ohio will continue to actively seek out state and federal funding opportunities for EE/PDR projects that will enable customers to save energy. Numerous sources of funding are available at the national, state and local levels for homeowners, industry, government organizations and nonprofits. Funding sources could include grants, tax-credits, loans or other mechanisms.

Additional Research Under Consideration

AEP Ohio initially identified over 70 technologies and program concepts as potential pilot program candidates. The initial database of options was developed through research of other utility programs, green technology sources, associations and experts in the industry. The database includes options for residential, commercial and industrial and includes many different end uses. Options with high suitability, savings potential and validation ratings were identified as pilot candidates. AEP Ohio also used the implementation timeline as criteria to establish potential pilot prioritization. Thirty pilot candidates were identified through the initial screening process. The remaining options were put on a watch list or not in the running for a pilot to be quickly implemented.

The technologies that did not pass the initial screen will remain in the overall database as they may show promise for future deployment. AEP Ohio intends to continually revise and evaluate the entire list to assess whether additional screening and research should be conducted. The options that did not pass the screening may still be viable, but did not pass the initial screen due to a number of factors including low suitability for AEP Ohio service territory, climate restrictions, low market potential, lack of savings

verification and the need for additional research.

New technologies enter the market every year. As a result, energy efficiency options are likely to be different from those being promoted today. AEP Ohio believes continuing to research new technologies and program concepts will aid us in developing future program plans.

The overall goal of AEP Ohio's research and development effort is to focus on supporting promising and innovative technologies and program concepts and to move them into the marketplace as quickly as cost effectiveness is achieved. AEP Ohio will pick promising technologies and through a collaborative effort develop and implement measures to fulfill the key R&D objectives of providing support to the implementation team for testing and making mid-stream adjustments to the current Plan as needed; and to prepare for the new and modified cost-effective programs needed to achieve EE/PDR targets in future plans.

5 GLOSSARY OF TERMS

Achievable Potential: the amount of energy use that efficiency can realistically be expected to displace assuming the most aggressive program scenario possible (such as providing end-users with payments for the entire incremental cost of more efficient equipment). This is often referred to as maximum achievable potential. Achievable potential takes into account real-world barriers to convincing end-users to adopt efficiency measures, the non-measure costs of delivering programs (for administration, marketing, tracking systems, monitoring and evaluation, etc.), and the capability of programs and administrators to ramp up program activity over time.

Applicability Factor: the fraction of the applicable dwelling units that are technically feasible for conversion to the efficient technology from an **engineering** perspective (e.g., it may not be possible to install CFL bulbs in all light sockets in a home because the CFL bulbs may not fit in every socket in a home).

Base Case Equipment End Use Intensity: the electricity used per customer per year by each base-case technology in each market segment. This is the consumption of the electric energy using equipment that the efficient technology replaces or affects. For example purposes only, if the efficient measure were a high efficiency lamp (CFL), the base end use intensity would be the annual kWh use per bulb per household associated with an incandescent light bulb that provides equivalent lumens to the CFL.

Base Case Factor: the fraction of the end use electric energy that is applicable for the efficient technology in a given market segment. For example, for residential lighting, this would be the fraction of all residential electric customers that have electric lighting in their household.

Coincidence Factor: the fraction of connected load expected to be “on” and using electricity coincident with the system peak period.

Cost-effectiveness: a measure of the relevant economic effects resulting from the implementation of an energy efficiency measure. If the benefits outweigh the cost, the measure is said to be cost-effective.

Cumulative Annual: refers to the overall savings occurring in a given year from both new participants and savings continuing to result from past participation with measures that are still in place. Cumulative annual does not always equal the sum of all prior year incremental values as some measures have relatively short measure lives and, as a result, their savings drop off over time.

Demand Response: the ability to provide peak load capacity through demand management (load control) programs. This methodology focuses on curtailment of loads during peak demand times thus avoiding the requirement to find new sources of generation capacity.

Early Replacement: refers to an efficiency measure or efficiency program that seeks to encourage the replacement of functional equipment before the end of its operating life with higher-efficiency units

Economic Potential: the subset of the technical potential screen that is economically cost-effective as compared to conventional supply-side energy resources. Both technical and economic potential screens are theoretical numbers that assume immediate implementation of efficiency measures, with no regard for the gradual “ramping up” process of real-life programs. In addition, they ignore market barriers to ensuring actual implementation of efficiency. Finally, they only consider the costs of efficiency measures themselves, ignoring any programmatic costs (such as marketing, analysis, administration) that would be necessary to capture them.

Effective Useful Life (EUL): the number of years (or hours) that the new energy efficient equipment is expected to function. Useful life is also commonly referred to as “measure life.”

End-use: a category of equipment or service that consumes energy (e.g., lighting, refrigeration, heating, process heat).

Energy Efficiency: using less energy to provide the same or an improved level of service to the energy consumer in an economically efficient way. Sometimes “conservation” is used as a synonym, but that term is usually taken to mean using less of a resource even if this results in a lower service level (e.g., setting a thermostat lower or reducing lighting levels). This recognizes that energy efficiency includes using less energy at any time, including at times of peak demand through demand response and peak shaving efforts.

Free Driver: individuals or businesses that adopt an energy efficient product or service because of an EE/PDR program, but are difficult to identify either because they do not receive an incentive or are not aware of exposure to the program.

Free Rider: participants in an EE/PDR program who would have adopted an EE/PDR technology or improvement in the absence of a program of financial incentive.

Incremental: savings or costs in a given year associated only with new installations happening in year.

Impact Evaluation: is the estimation of effects from the implementation of one or more EE/PDR programs. Most program impact projections contain ex-ante estimates of savings. These estimates are what the program is expected to save as a result of its implementation efforts and are often used for program planning and contracting purposes and for prioritizing program funding choices. In contrast, the impact evaluation focuses on identifying and estimating the amount of energy and demand the program actually provides.

Integrated Data Collection (IDC): an approach in which surveys of key market actors and end-use customers (EUCs) are conducted in “real time” as close to the key intervention points as possible; usually integrated as part of the standard program implementation or other program paperwork process.

Lost-opportunity: refers to an efficiency measure or efficiency program that seeks to encourage the selection of higher-efficiency equipment or building practices than would typically be chosen at the time of a purchase or design decision.

Market Characterization: refers to evaluations focused on the evaluation of program-induced market effects when the program being evaluated has a goal of making longer-term lasting changes in the way a market operates. These evaluations examine changes within a market that are caused, at least in part, by the EE/PDR programs attempting to change that market.

Market Transformation: an approach in which a program attempts to influence “upstream” service and equipment provider market channels and what they offer end customers, along with educating and informing end customers directly. The emphasis is on influencing market channels and key market actors other than end customers.

Measure: any action taken to increase efficiency, whether through changes in equipment, control strategies, or behavior. Examples are higher-efficiency central air conditioners, occupancy sensor control of lighting, and retro-commissioning. In some cases, bundles of technologies or practices may be modeled as single measures. For example, an ENERGY STAR™ home package may be treated as a single measure.

MegaWatt (MW): a unit of electrical output, equal to one million watts or one thousand kilowatts. It is typically used to refer to the output of a power plant.

MegaWatt-hour (MWh): one thousand kilowatt-hours, or one million watt-hours. One MWh is equal to the use of 1,000,000 watts of power in one hour.

Net-to-gross (NTG) Ratio: a factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts

Plan: either a collection of similar programs addressing the same market, technology, or mechanisms; or the set of all programs conducted by one organization.

Process Evaluation: is a systematic assessment of an EE/PDR program for the purposes of documenting program operations at the time of the examination and identifying improvements that can be made to increase the program's efficiency or effectiveness for acquiring energy resources.

Program: a mechanism for encouraging EE/PDR. May be funded by a variety of sources and pursued by a wide range of approaches. Typically includes multiple measures.

Program Potential: the efficiency potential possible given specific program funding levels and designs. Often, program potential studies are referred to as "achievable" in contrast to "maximum achievable."

Remaining Factor: the fraction of applicable units that have not yet been converted to the electric EE/PDR measure; that is, one minus the fraction of units that already have the EE/PDR measure installed.

Replace on Burnout (ROB): a EE/PDR measure is not implemented until the existing technology it is replacing fails. An example would be an energy efficient water heater being purchased after the failure of the existing water heater.

Resource Acquisition: an approach in which end customers are the primary target of program offerings (e.g., using rebates to influence customers' purchases of end use equipment).

Retrofit: refers to an efficiency measure or efficiency program that seeks to encourage the replacement of functional equipment before the end of its operating life with higher-efficiency units (also called "early retirement") or the installation of additional controls, equipment, or materials in existing facilities for purposes of reducing energy consumption (e.g., increased insulation, low flow devices, lighting occupancy controls, economizer ventilation systems).

Savings Factor: the percentage reduction in electricity consumption resulting from application of the efficient technology used in the formulas for technical potential screens.

Technical Potential: the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end-users to adopt the efficiency measures. It is often estimated as a "snapshot" in time assuming immediate implementation of all

technologically feasible energy saving measures, with additional efficiency opportunities assumed as they arise from activities such as new construction.

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Summary: Exhibit Exhibit A to Application and Request for Expedited Consideration (Part 2 of 3) electronically filed by Anne M Vogel on behalf of American Electric Power Company, Inc.