Bonneville Power Administration

2012 Update to the 2010-2014 Action Plan for Energy Efficiency

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Table of Contents

1. Introduction and Background 1

1.1. Objectives 2

1.2. Guiding Principles 2

1.3. Regional Coordination 3

1.4. Opportunities, Drivers and Challenges 5

2. Summary of Savings 8

2.1. Overview 8

2.2. Adjustments since the 2010 Action Plan 9

2.3. Sources for Savings 10

2.3.1. Programmatic Savings 10

2.3.2. Non-programmatic savings 10

2.3.3. Market Transformation 11

2.3.4. Carryover 12

2.4. Programmatic Savings Summary 14

2.4.1. Adjustments since the 2010 Action Plan 14

2.5. Programmatic Costs 15

2.5.1. Adjustments since the 2010 Action Plan 16

2.6. Residential Sector Strategy 18

2.6.1. Accomplishments 18

2.6.2. Savings Estimates, Budgets and Performance Metrics 18

2.6.3. Adjustments since the 2010 Action Plan 20

2.6.4. Achieving the Savings 20

2.6.5. Overview of Market Barriers and Challenges 24

2.6.6. Marketing Strategies and Tactics 25

2.7. Commercial Sector Strategy 27

2.7.1. Accomplishments 27

2.7.2. Savings Estimates, Budgets and Performance Metrics 27

2.7.3. Adjustments since the 2010 Action Plan 28
2.7.4. Achieving the Savings....29
2.7.5. Overview of Market Barriers and Challenges 32
2.7.6. Marketing Strategies and Tactics 33
2.8. Industrial Sector Strategy....34
2.8.1. Accomplishments....34
2.8.2. Savings Estimates, Budgets and Performance Metrics 34
2.8.3. Adjustments since the 2010 Action Plan 35
2.8.4. Achieving the Savings....35
2.8.5. Overview of Market Barriers and Challenges 37
2.8.6. Marketing Strategies and Tactics 38
2.9. Agricultural Sector Strategy....39
2.9.1. Accomplishments....39
2.9.2. Savings Estimates, Budgets and Performance Metrics 39
2.9.3. Adjustments since the 2010 Action Plan 40
2.9.4. Achieving the Savings....40
2.9.5. Overview of Market Barriers and Challenges 42
2.9.6. Marketing Strategies and Tactics 43
2.10. Federal Sector Strategy 44
2.10.1. Accomplishments 44
2.10.2. Savings Estimates, Budgets and Performance Metrics....44
2.10.3. Adjustments since the 2010 Action Plan....45
2.10.4. Achieving the Savings 46
2.10.5. Overview of Market Barriers and Challenges....48
2.10.6. Marketing Strategies and Tactics....48
2.11. Distribution System Efficiency Sector Strategy....50
2.11.1. Accomplishments 50
2.11.2. Savings Estimates, Budgets and Performance Metrics....50
2.11.3. Adjustments since the 2010 Action Plan....51

2.11.4. Achieving the Savings 51
3. Research Activities 54
3.1. Overview 54
3.2. Emerging Technology Research 54
3.3. Existing Measure Research 58
3.4. Evaluation and Other Research 58
3.5. Behavior-based Energy Efficiency (BBEE) programs 59
Appendix A: BPA Departments: Cross-Sector Activities 62
Appendix B: 6th Power Plan Details 67
APPENDIX C: Abbreviations & Acronyms 71

Definitions

Customer Utility/Utility Customer: An electric utility or federal agency that has a power sales contract to purchase power at wholesale from BPA pursuant to section 5(b) of the Northwest Power Act.

End-use Consumer/End-users: A retail consumer of power supplied by a Customer Utility.

Energy Savings: The ascribed, deemed, calculated, estimated, evaluated, or verified conservation.

Historic Achievement: Energy savings achieved through BPA's existing opportunities, as reported in 2009. These savings are used to project what BPA's Energy Savings would be in the absence of improvements to current opportunities and/or development of new activities and emerging technologies.

Incentive: A payment by a Customer Utility to its end-use consumers to encourage them to install high-efficiency measures or projects.

Initiative: May refer to an individual program, an offering or some combination of both.

Legacy Savings: Energy Savings achieved outside of the current rate period.

Lost Opportunity Savings: Energy Savings which can only be achieved in the time they are acquired. New construction, natural replacement and major renovation savings are considered to be lost opportunity savings

Measure: One or more changes in system configuration, equipment specifications or operating practices that reduce electric power consumption as a result of increases in the efficiency of energy use, production or distribution.

Offering: A reimbursement offered to Customer Utilities for measures or actions implemented at the End-user level that lead to an increase in efficiency over existing or baseline conditions.

Opportunity: An umbrella term referring to a collection of programs, offerings and customer support services.

Program: An activity or activities that result in direct acquisition of energy efficiency resources at the end-use customer level, typically delivered by a utility or a third party through a turn-key or turn-key/hybrid contract (e.g., Energy Smart Grocer, Energy Smart Industrial). The term "program" also may refer to an activity led by an outside entity, such as a utility or NEEA.

Program Delivery Partner: A third-party contractor competitively selected to provide implementation services related to a specific program.

Project: An action at a building or facility level to increase the efficiency of that structure.

Reimbursement: A payment by BPA to its Utility Customers to compensate them for incentives paid to End-users for measure installation or project implementation.

Retrofit Savings: Energy Savings that are available through the replacement of non-efficient technology to an efficient technology that can be acquired at any time.

EXECUTIVE SUMMARY

The Bonneville Power Administration (BPA) and its Customer Utilities have been a leading force in promoting energy efficiency in the Pacific Northwest for the past four decades. Since the early 1980s, BPA, largely through its public power utility customers, has acquired more than 1,200 average megawatts (aMW) in electricity savings.

In February 2010, the Northwest Power and Conservation Council released its 6th Power Plan, which establishes energy efficiency targets for the region over the next five years. BPA has taken responsibility for achieving the public power share of the 1,200 aMW target, which is 504 aMW of savings. BPA developed an *Action Plan for Energy Efficiency* in 2010 to achieve the aggressive targets. The following document is the 2012 update of that plan.

The original 2010 Action Plan entailed a review of BPA's existing energy efficiency programs to project their savings potential over five years. BPA also developed a strategy to achieve savings that are unlikely to occur through status quo programs: expand existing opportunities; introduce new opportunities; and assess the savings potential of new and emerging technologies.

Several changes since the development of the 2010 EE Action Plan have resulted in updates to the expected savings, costs and source of acquisition for Energy Efficiency. The achievement of more savings in 2010 and 2011 than anticipated, along with lower than expected acquisition costs, has resulted in reduced savings needed to be achieved to meet the 5-year Council target in 2012-2014. BPA will continue to offer a robust set of energy efficiency programs and measures. While the Plan includes individual sector goals, it is important to note that these projections are planning estimates, and that EE is focused most on meeting the overall portfolio target in total.

A number of market, institutional and technological factors will influence the outcome of BPA's energy efficiency efforts beginning in 2012. The structure of BPA's energy efficiency arrangements with its Utility Customers changed substantially October 1, 2011, establishing a new way of allocating funds which provides both opportunities and challenges to achieving savings. In addition, changes to codes and standards, like federal standards for lighting that take effect in 2012, mean the pressure will mount to find innovative measures to produce Energy Savings. And new guidelines at the Regional Technical Forum (RTF) will up the ante for research and data collection to reach deemed savings for efficiency measures.

SUMMARY OF SAVINGS AND TARGETS

BPA's primary role in acquiring savings is to guide the delivery of opportunities and programs, and provide the necessary tools, technical support and financial resources to its Utility Customers. The Utility Customers play the critical role in developing and delivering programs and in facilitating the vast majority of Energy Savings in the region. Both BPA and its customers collaborate with multiple entities and stakeholders to carry out activities that contribute to meeting the region's energy efficiency goals.

Energy efficiency savings are acquired through numerous channels, including programmatic efforts, market transformation, and non-programmatic savings. In addition, there is some carryover of savings from previous periods. While the focus of this Action Plan is on BPA customers' programmatic achievements, other channels provide significant savings. Table 1 displays the summary of savings estimated for all channels.

Several adjustments that reflect current information were made to overall Energy Savings since the 2010 Action Plan. The most significant are the addition of compact fluorescent lighting (CFL) savings in 2012 and 2013; an increase in the estimate for non-programmatic savings; reduction in savings from the Distribution System Efficiency Initiative (DSEI) sector; an accounting for carryover savings that distributes them through 2012-2014; and reduced savings from NEEA's market transformation activities.

Table 1. Summary of Energy Savings and Targets (aMW, 2010-2014)[1]

Savings by funding source	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	Total Savings
BPA Funded Programmatic Savings	57	105	46	42	39	**289**
Utility Self Funded Savings	23	2	16	14	13	**68**
Norpac	0	1	6	0	5	**12**
Market Transformation (NEEA)	11	11	8	8	8	**46**
Non-Programmatic	15	14	14	14	13	**70**
Carryover	0	0	11	11	11	**34**
Total Annual Savings	**106**	**132**	**102**	**89**	**89**	**518**
Total Reported 6th Plan Savings*	**103**	**128**	**98**	**86**	**89**	**504**

PROGRAMMATIC SAVINGS AND COSTS

Table 2 includes actual 2010 savings, estimated 2011 savings and projected 2012-2014 savings. BPA's planning and program staff forecast future savings by analyzing the historic savings achievements, reviewing trajectories of existing activities, and identifying new opportunities as well as areas of adjustment. In 2010 and 2011, BPA and its Customer Utilities over-achieved targets set for annual saving acquisitions. As a result, energy savings targets in 2012-2014 are recalibrated so five-year savings achieve the public power target of 504 aMW overall, with 356 aMW of programmatic savings.

[1] Totals may not be summed from components due to rounding to nearest whole number. Total reported 6th Plan savings accounts for one-year measure life adjustments to annual reported savings

Table 2. Total Annually Reported Programmatic Energy Savings (aMW)

	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 **Total**
Portfolio	**80**	**107**	**62**	**56**	**51**	**356**
By Sector						
Residential	31	39	28	25	21	**143**
Commercial	24	26	18	15	11	**94**
Industrial	14	30	7	7	8	**67**
Agriculture	8	9	5	5	5	**32**
DSEI	0	1	1	2	2	**5**
Federal	3	3	3	3	3	**15**

Several adjustments that reflect current information were made to programmatic savings since the 2010 Action Plan. The 2012 Update includes savings achievements for standard CFLs in 2012 and 2013 due to the recent decision to approve CFL savings for two more years; a decrease in commercial lighting savings due to a change in code; a reduction in savings expected from heating, ventilation and air-conditioning measures and emerging technologies; a reduction in savings from the Energy Smart Industrial program due to budget adjustments; and a reduction in savings from DSEI due to slower-than-expected ramp-up and program development.

In addition to estimating savings, EE sector program and planning staff calculated estimated cost projections based on historical and projected reimbursement levels, and program delivery and administrative costs. This Action Plan update includes only the capital costs of implementation (reimbursements, performance payments and third-party implementation). It does not include expense items, such as research, staffing, state and tribal weatherization grants, debt service, database development, non-programmatic savings tracking or NEEA funding costs.

Table 3 displays total programmatic costs (BPA and utility-funded) by year for the period 2010-2014. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh); millions of dollars per average megawatt ($M/aMW); and levelized cost over the lifetime of the savings (levelized $/kWh).

Table 3. Total and Average Programmatic Costs ($ Millions) – BPA and Utility Customer Funded

	$ Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/MWh)
	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total	2010-2014	2010-2014	2010-2014
Portfolio	**$ 137.4**	**$ 163.5**	**$ 121.7**	**$ 118.0**	**$ 120.8**	**$ 661.4**	**$ 0.21**	**$ 1.9**	**$ 37.27**
By Sector									
Residential	$ 47.8	$ 76.4	$ 60.4	$ 61.2	$ 68.9	**$ 314.6**	**$ 0.21**	**$ 1.8**	**$ 50.04**
Commercial	$ 43.5	$ 34.6	$ 33.0	$ 27.5	$ 18.4	**$ 157.0**	**$ 0.20**	**$ 1.8**	**$ 17.66**
Industrial	$ 30.4	$ 35.1	$ 15.2	$ 15.9	$ 18.4	**$ 115.0**	**$ 0.24**	**$ 2.1**	**$ 28.92**
Agriculture	$ 10.4	$ 9.3	$ 5.0	$ 3.9	$ 5.1	**$ 33.7**	**$ 0.17**	**$ 1.4**	**$ 60.04**
DSEI	$ 0.7	$ 0.7	$ 2.0	$ 3.3	$ 4.0	**$ 10.7**	**$ 0.24**	**$ 2.1**	**$ 16.67**
Federal	$ 4.8	$ 7.4	$ 6.1	$ 6.1	$ 6.1	**$ 30.5**	**$ 0.22**	**$ 1.9**	**$ 34.00**

The table reflects total regional cost to achieve public power's share of programmatic savings to reach the target (356 aMW), including costs Customer Utilities are expected to self-fund. The numbers also include costs of the conservation rate credit (CRC) from 2010 and 2011 savings acquisitions.

Table 4 provides the BPA funded only costs for programmatic savings toward reaching the 6th Plan target. Total capital costs for BPA funded savings totals $459 million dollars over the five year period. In 2010 and 2011, $53 million dollars of Conservation Rate Credit (CRC) expenses were also spent; resulting in total BPA funded programmatic dollars of $512 million dollars.

Table 4. BPA Funded Costs ($ Millions) - CRC and Capital

BPA Funded Costs 2010 - 2014						
	2010	**2011**	**2012**	**2013**	**2014**	**Total**
CRC	$41	$12	$0	$0	$0	**$53**
Capital	$58	$162	$89	$75	$75	**$459**
Total	**$99**	**$174**	**$89**	**$75**	**$75**	**$512**

Several adjustments that reflect current information were made to costs since the 2010 Action Plan. The most significant adjustments are overall reduction in expected acquisition costs based on actual cost data from 2010 and 2012, as well as the exclusion of expenses. With these adjustments, total and average costs are slightly reduced from 2010.

MEETING THE TARGETS

BPA energy efficiency staff has developed strategies and plans for how to reach the targets in each of the sectors listed on Table 3. The 2012 Update to the Action Plan lays out the specific efforts that will be undertaken to expand existing opportunities and introduce new ones, and to assess the Energy Savings potential of new and emerging technologies.

A robust research and development effort is also under way to keep the pipeline of measures full and to explore the potential for a behavior-based approach to energy efficiency. In addition to actions within BPA's energy efficiency department, other parts of the Agency contribute significantly to meeting the Energy Savings targets in the 6th Power Plan.

1. INTRODUCTION AND BACKGROUND

Since the passage of the Pacific Northwest Electric Power Planning and Conservation Act in 1981, the Bonneville Power Administration (BPA or the Agency) has been a leading force in supporting the development of conservation in the Pacific Northwest for the past four decades; BPA and its public power utility customers have acquired total electricity savings of more than 1,200 average megawatts (aMW).

In February 2010, the Northwest Power and Conservation Council (the Council) released its final 6th Power Plan for the Northwest, which establishes conservation targets based on the Council's assessment of long-term achievable conservation potential. The 6th Power Plan calls for the region to acquire 1,200 aMW of conservation over the five-year period from 2010 through 2014. Of that amount, BPA has taken responsibility for achieving the public power share of approximately 42 percent or 504 aMW of savings. This amount is double BPA's previous targets and approximately one and a-half times the Energy Savings achieved from 2005 through 2009.

To achieve these aggressive goals, BPA conducted a detailed planning exercise, which resulted in the 2010-2014 BPA Action Plan for Energy Efficiency[2] (2010 Action Plan) dated March 2010. BPA's planning began with a careful review of its existing programs to project their savings potential over the five-year planning period. The projections were compared with the new targets to assess the size and composition of the increase needed to meet the goals. Next, BPA developed a strategy to achieve the required savings using a three-pronged approach:

- Expanding the market reach and savings of existing opportunities by adding measures, enhancing marketing, increasing and/or optimizing financial reimbursements, streamlining and simplifying programs and program rules, and leveraging coordination with regional stakeholders.

- Introducing new opportunities that target market segments and conservation measures with significant energy savings potential, as identified in the 6th Power Plan.

- Continuing to assess the savings and cost-effectiveness of new and emerging technologies for their potential to contribute to regional conservation goals.

The final 2010 Action Plan quantified public power's share of the target, identified priorities and described an overarching strategy and sector-specific plans for achieving the savings target.

This document, the 2012 Update, serves as a revision to the 2010 Action Plan. While continuing to use the 6th Power Plan targets and measures as the planning basis, the 2012 Update provides:

- Updates of recent savings achievements.

- Projections of 2012-2014 savings and costs based on updated information.

[2] http://www.bpa.gov/Energy/N/pdf/BPA_EE_Action_Plan_External_Final_032410.pdf

- The course of action BPA plans to take to achieve its remaining share of the regional conservation target.

BPA plans to update the Action Plan annually through a collaborative process involving the Utility Sounding Board (USB), sector leads and supporting energy efficiency staff. Each update will be finalized prior to the October 1 start of the new fiscal year.

1.1. Objectives

The programs, offerings and activities outlined in the 2010 Action Plan and this 2012 Update are designed to meet public power's share of the conservation targets established by the 6th Power Plan. The 2012 Update summarizes achievements and provides a roadmap for BPA to work with customer utilities to meet the 6th Power Plan targets over the remainder of the five-year period. In addition to this objective, the updated Action Plan seeks to:

- Outline strategies that meet the Council's targets in a least-cost way.
- Generate among stakeholders a shared perspective and ownership of the regional conservation targets.
- Create alignment within the BPA energy efficiency organization between sector- and portfolio-level priorities.
- Provide an update on research activities, new initiatives and resources needed to achieve the 6th Power Plan targets.

The Action Plan and its updates serve as an operational tool to guide BPA's program decision-making and evaluate progress toward achieving the savings targets. As implementation of the Action Plan continues to move forward, BPA will re-evaluate planning assumptions for each sector and make adjustments as needed to adapt to evolving technology and market conditions.

1.2. Guiding Principles

Acquisition of conservation resources is a long-term process, extending beyond the horizon of this five-year Action Plan. BPA is committed to efficiency and is devoting the necessary resources to support it into the future as a major element in the region's resource mix. The Action Plan is guided by a number of overarching principles, consistent with BPA's long-term vision. The primary principle comes from the Long-Term Regional Dialogue Policy:

> *BPA will work collaboratively with its public utility customers to pursue conservation equivalent to all cost-effective conservation in the service territories of such customers at the lowest cost to BPA[3].*

Other principles help define how the above principle will be implemented. They include:

[3] http://www.bpa.gov/power/pl/regionaldialogue/

Lowest cost acquisition. All of public power benefits when conservation is achieved at the lowest cost. BPA continues to evaluate technologies and programs with the greatest potential to provide energy savings at the lowest cost and acquire the savings as efficiently as possible. The Action Plan prioritizes activities and resources to achieve this objective.

Leadership and innovation. For over 30 years, the Northwest has been a leader in using conservation as a resource to meet BPA's power supply obligations. BPA will continue to play an instrumental role in achieving efficiency through cutting-edge research on new technologies, creative savings opportunities, technical rigor and coordination.

Conservation at the local utility level. BPA's role as a regional provider of wholesale electricity dictates its role as a facilitator, not an implementer, of energy efficiency initiatives (with limited exceptions, such as Energy Smart Federal Partnership). In this role, BPA will continue to work with customer utilities to acquire conservation and enable them to provide programs and services to their End-use consumers.

Climate change response. BPA is committed to addressing climate change, and acquiring cost-effective conservation is a key part of its climate change strategy. The Agency continues to track and prepare for promoting cost-effective conservation strategies to address policy and legislative changes, should they occur.

Regional infrastructure. BPA will continue to coordinate with Customer Utilities to design and implement regional programs and take advantage of economies of scale. BPA's strategies to acquire conservation include providing a higher level of implementation support and tools to Customer Utilities. These include technical, marketing and project support, as well as coordination with trade allies to assist Customer Utilities in working with their End-use consumers.

Broad and balanced initiatives. BPA continues to make available a broad and balanced set of initiatives and reimbursements to meet the unique needs of its Utility Customers.

Strong relationships. To achieve the aggressive targets established in the 6th Power Plan and foster economic development, BPA will continue working with Customer Utilities, stakeholders and energy efficiency organizations to minimize redundancy, maximize efficiency and leverage each entity's strengths.

Streamlined processes. BPA will continue to focus on increasing administrative efficiency, particularly when Utility Customers seek reimbursement for installed measures. Programs and documentation requirements will be streamlined as much as possible.

1.3. Regional Coordination

As a marketer of power at wholesale with limited access to end-use consumers, BPA works through its Utility Customers and coordinates with several non-customer entities to meet its goals. BPA's primary role in acquiring Energy Savings is to guide delivery of opportunities and programs, and provide the necessary tools, technical support and financial resources to its Customer Utilities. Utilities play the critical role in developing

and delivering programs and in generating the vast majority of Energy Savings in the region.

BPA, its Customer Utilities and the Northwest Energy Efficiency Alliance (NEEA) operate within a Northwest energy efficiency marketplace that has multiple participants, each with a unique and essential role. BPA will continue to collaborate with these entities and other stakeholders to identify and pursue activities that contribute to meeting the regional goals. BPA staff works to leverage regional efforts, ensure regional organizations focus on priorities, avoid overlaps and redundancy, and maintain collective momentum.

Public Power Customer Utilities. BPA's more than 135 public power Customer Utilities are fundamental to BPA's achieving conservation. They play a critical role in developing, marketing and delivering programs to End-users, and their programs produce the majority of energy savings for which BPA is responsible. Public power customers include electric cooperatives, municipalities, peoples and public utility districts, tribal utilities, and federal agencies that span a broad range of geographic conditions, climate zones and population densities. Customer Utilities may implement programs independently, add their own incentives or services to BPA's offerings, and/or use third-party contractors to manage and administer programs. BPA often looks to the Utility Sounding Board (USB), a group of representatives from a sample of utilities BPA serves, for input on energy efficiency program concepts and ways to capture energy savings most effectively, while meeting the needs of BPA's diverse utility customers.

The Northwest Power and Conservation Council (Council). The Council has eight members, two appointed by each of the governors of the four Northwest states: Idaho, Montana, Oregon and Washington. One of the Council's primary roles is to guide acquisition of conservation resources in the Northwest through its power plan.[4] BPA resource acquisitions are guided by the Council's power plan, which also serves as a guidepost to assist the region's retail electric utilities in planning within their service territories.

Regional Technical Forum (RTF). The RTF is the region's preeminent technical advisory committee on energy efficiency. It was established in 1999 to develop standards to verify and evaluate conservation savings. Voting members are appointed by the Council and include individuals experienced in energy efficiency program planning, implementation and evaluation. In 2011, the Council adopted a recommendation from the NEET committee to form a Policy Advisory Committee for the RTF. This committee, which began meeting in July 2011, will provide policy recommendations to the Council on how best to meet the needs of the RTF's stakeholders.

The Northwest Energy Efficiency Alliance (NEEA). NEEA supports the development and adoption of energy efficient products and services primarily through market transformation. BPA representatives serve on NEEA's Board of Directors and advisory committees. In the past, BPA provided 50 percent of NEEA's total regional funding. Over the five-year period starting in 2010, BPA is providing 35 percent of NEEA's regional funding, and public power utilities are directly funding an additional eight percent. According to its 2009 Operating Plan, NEEA expects to contribute 100 aMW of net

[4] Information about the Council's role in energy can be found on the organization's website at http://www.nwcouncil.org/energy/Default.htm

market effects[5] and 200 aMW of total regional savings from 2010 to 2014. BPA aligns its targets with the Council, and BPA reports only those savings achieved above the 6th Power Plan baseline, which is currently expected to be 46 aMW in the 2010-14 period.

Regional Emerging Technology Advisory Committee (RETAC) and Energy Efficiency Emerging Technology (E3T). There are three closely linked components to BPA's efforts to fill the pipeline with new energy efficient technologies: 1) BPA's Technology Innovation R&D projects; 2) BPA's E3T program, including technical advisory groups; and, 3) the Regional Technology Advisory Committee (RETAC), a collaboration between BPA and NEEA to provide regional coordination on emerging technologies, as well as NEEA's emerging technology advisory committee. In 2008, BPA launched E3T, an effort funded through BPA's Office of Technology Innovation. E3T is focused on identifying energy savings and removing technical barriers to commercialize energy efficiency technologies that have not yet been widely accepted into the market.

1.4. Opportunities, Drivers and Challenges

A number of market, institutional, and technological factors will influence the outcome of BPA's energy efficiency initiatives during the 6th Power Plan period. The following factors have been identified as driving and supporting accelerated acquisition of conservation or having the potential to hinder BPA's efforts.

Post-2011. BPA's energy efficiency framework changed substantially October 1 and offers both benefits and challenges. BPA energy efficiency funding is now allocated to Customer Utilities based on the amount of each customer's load served by BPA at BPA's Tier 1 priority firm (PF) power rate (aka Tier 1 load). This allocation methodology provides a greater degree of Customer Utility equity, but may also lead to less flexibility in terms of matching available BPA funds to conservation demand or opportunity. Various mechanisms will be available to increase flexibility and allow customers local control of how and where funds are invested. Also to increase local control, BPA will budget for acquiring 75% of public power's conservation target and plan on customers (on average) self-funding the remaining 25% of the target.

Limited control over measure uptake. As noted in the 2010 BPA Action Plan, BPA has limited direct control over its customer utilities' energy efficiency activities and limited access to end-use consumers. Many smaller utilities, particularly those in rural areas, have few staffing resources and may have constraints that pose significant challenges to delivering energy efficiency services and programs.

Federal lighting standards. Beginning in 2012, federal standards for residential incandescent and non-residential T-12 fluorescent bulbs will be phased-out under the Energy Independence and Security Act of 2007 (EISA). This will result in changes to the baseline efficiency for CFLs and commercial lighting and less potential for programmatic energy savings in the residential and commercial sectors. Over the next two years, BPA will continue to offer reimbursements for lighting, though incentive amounts are likely to be decreased due to a reduction in energy savings. BPA will continue to support market

[5] Net market effects are regional market savings above the NEEA-defined baseline and net of utility incentives.

transformation and offer initiatives to facilitate adoption of new lighting technologies, such as light emitting diodes (LEDs) and new lighting control strategies.

Changing codes and standards. A growing trend at the federal level to increase efficiency codes and standards can help the region and BPA achieve significant Energy Savings over the long term. However, as higher efficiency levels become the baseline and lower efficiency technologies are phased out (e.g., standard incandescent light bulbs), it will take a larger volume of more complex, higher-cost measures to generate the required energy savings.

Regional Technical Forum Guidelines[6]. In 2011, the RTF approved the Guidelines for RTF Savings Estimation Methods (Guidelines)[7]. The Guidelines describe how the RTF will determine whether the quality of data and analytical methods are sufficient to produce reliable savings estimates for energy efficiency measures. The RTF will use the Guidelines to review its existing library of unit energy savings estimates and the protocols for estimating savings, as well as to evaluate prospective new measures. The newly appointed RTF Policy Advisory Committee will review and provide final approval for use of the Guidelines. While the Guidelines are a welcome development in streamlining and clarifying the RTF process, it could in some cases increase the amount of research required and length of time it takes for measures to be approved by the RTF.

Regional Research Activities. Applying the RTF Guidelines to approved measures and new measures will result in a substantial increase in primary and secondary research required by the region. The work needed to bring savings estimates in line with the Guidelines will mean a substantial increase in research efforts, as well as more funding and resources. BPA will coordinate with the RTF and others in the region to create an outline for completing the research. For more details on BPA's existing measure research, see Section 3.3.

EE Central (Planning Tracking and Reporting (PTR) System). Since 2001, BPA's PTR system has been the central infrastructure to monitor, document and report regional conservation activity. Utilities and other stakeholders, such as trade allies and third-party implementers, access the PTR system through a web interface to report their energy efficiency activities. In 2010, BPA hired a third-party contractor, Nexant, to re-write the PTR system, which is now called EE Central. Nexant has developed detailed requirements and is currently developing and implementing the new tracking and reporting system, which will be operational in fiscal year 2012.

Economic downturn. The continuing downturn in both the national and regional economy will remain a challenge for securing investments in energy efficiency. End-use consumers in all sectors may continue to be unable or reluctant to pay for new equipment or infrastructure improvements. Current trends and forecasts do not indicate a swift economic recovery, though the success in energy efficiency activity that BPA has

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[6] Information about the RTF provided by *The Charter of the Regional Technical Forum of the Pacific Northwest Electric Power and Conservation Planning Council*: http://www.nwcouncil.org/energy/rtf/charter.htm

[7] Operative Guidelines available at http://www.nwcouncil.org/energy/rtf/subcommittees/deemed/Default.asp

experienced in 2010 and 2011 suggests the economy is spurring interest and participation in BPA and utility programs.

Energy and climate legislation. Congress has not enacted the substantive energy and climate-related legislation that was predicted prior to 2010. If these efforts are rekindled, they could affect BPA's efforts to achieve energy efficiency targets. New laws could benefit BPA in reaching its targets by creating new efficiency standards, or promoting and/or providing incentives for energy efficient technologies. BPA will continue to track federal legislative activities and adjust its activities and savings assumptions as warranted.

2. SUMMARY OF SAVINGS

2.1. Overview

As stated in Section 1, BPA has taken responsibility for the public power share of the Council's 6th Power Plan conservation five-year target, resulting in a goal of 504 aMW[8]. To support public power in achieving this target, BPA's energy efficiency staff has developed strategies to enhance existing opportunities. It has also identified new measure offerings, program concepts and longer-term research and development activities to support the acquisition of Energy Savings.

BPA's savings are acquired through numerous channels, categorized for this plan as programmatic, market transformation, non-programmatic savings and carryover. The focus of this report is on BPA customers', primarily public power utilities, programmatic savings, which are acquired through direct program-related activities and reimbursements offered by BPA and utilities. Market transformation savings come through NEEA's efforts; non-programmatic savings are those that occur outside of specific BPA and utility programs; and carryover savings are those achieved above the 6th Power Plan baseline and in excess of the 5th Power Plan targets.

Table 5 provides a summary of savings for the 2010-2014 period. The first column to the left contains 2010 actual savings achievements; the second contains 2011 savings estimated from best available information[9]; and the remaining columns are projected annual savings through 2014. Approximately 356 aMW of savings are expected to be achieved through programmatic activities between 2010 and 2014, 169 of which are projected from 2012-2014. BPA-funded savings account for 289 aMW, with utility self-funded savings estimated at 67 aMW (19[10] percent) of total programmatic savings. Non-programmatic savings is currently estimated to be 70 aMW. Additional savings of 46 aMW are expected from market transformation activities through NEEA initiatives. Savings from Norpac[11], a large industrial project, and carryover savings from the 5th Power Plan account for an additional 34 aMW toward the 6th Power Plan target.

[8] This goal is defined at the BPA territory level; BPA does not allocate individual utility targets toward the goal.

[9] Based on reported savings as of November 2011. Final achieved savings for 2011 will be updated in the 2013 update of the EE Plan.

[10] Public power achievements of self-funded savings in 2011 where 2 percent of total programmatic achievements. Therefore, the five year overall percentage for self-funding has been adjusted to 19 percent, assuming that public power will self-fund 25% in 2012-2014.

[11] Norpac is a large-scale industrial project in Cowlitz County, which focuses on new screening and refining systems throughout a Weyerhaeuser plant. The project is considered in achievements toward 6th Power Plan targets, but is not counted toward BPA's Industrial internal programmatic goal because the project was funded outside of the Industrial capital budget.

Table 5. Summary of Energy Savings and Targets (aMW, 2010-2014)[12]

Savings by funding source	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	Total Savings
BPA Funded Programmatic Savings	57	105	46	42	39	**289**
Utility Self Funded Savings	23	2	15	14	13	**67**
Norpac	0	1	6	0	5	**12**
Market Transformation (NEEA)	11	11	8	8	8	**46**
Non-Programmatic	15	14	14	14	13	**70**
Carryover	0	0	11	11	11	**34**
Total Annual Savings	**106**	**132**	**101**	**89**	**89**	**517**
Total Reported 6th Plan Savings	**103**	**128**	**98**	**86**	**89**	**504**

2.2. Adjustments since the 2010 Action Plan

This updated Action Plan reflects changes in savings projections due to several factors. The most significant adjustments are the result of the following:

- The Council's 6th Power Plan and the 2010 Action Plan anticipated the exclusion of standard twister CFLs beginning in 2012 as a result of the EISA legislation. Since the legislation will be implemented in phases, the RTF recently updated[13] savings levels for CFLs for two more years. The 2012 Update includes savings achievements for standard CFLs in 2012 and 2013.

- As discussed below, recent data indicate non-programmatic savings are occurring at a higher rate than forecast earlier, based on NEEA-estimates and the EPACT commercial lighting federal standard, which takes effect in 2012. As a result, BPA has adjusted expected non-programmatic savings upward by 20 aMW.

- The 2010 Action Plan did not account for carryover savings. The 2012 Update has distributed these savings through years 2012-2014.

- In the 2010 Action Plan, BPA planned for 20 aMW of savings from the Distribution Efficiency Initiative sector, based on estimates of potential from the 6th Power Plan. This program, however, has been slower to ramp up than expected and estimated savings have been decreased to 5 aMW in the 2012-2014 period.

- BPA has lowered the expected savings from NEEA's market transformation activities. In the 2010 Action Plan, NEEA's estimated market transformation savings were calculated based on the NEEA savings baseline. NEEA has since started reporting its savings against the 6th Power Plan baseline, which results in lower market transformation savings that are eligible to be reported toward the savings target.

[12] Totals may not be summed from components due to rounding to nearest whole number. Total reported 6th Plan savings accounts for one-year measure life adjustments to reported savings.

[13] http://www.nwcouncil.org/energy/rtf/decisions.asp

2.3. Sources for Savings

2.3.1. Programmatic Savings

Programmatic savings are energy savings achieved through BPA's customer utilities and BPA direct acquisition programs, funded through BPA reimbursement and direct utility funding. These savings are achieved in each sector through a mix of deemed savings, calculated measures, custom projects and third-party programs. The following sections of this plan discuss these efforts in detail.

2.3.2. Non-programmatic savings

Non-programmatic savings are 1) those that occur outside of BPA and utility programs, for which BPA and public power utilities do not pay a reimbursement and 2) for measures where the efficiency is higher than that specified in the 6th Power Plan baseline. These include energy savings from new building codes and appliance standards, and market-induced adoption of energy efficiency.

Non-programmatic savings comprise a significant portion of the potential for energy efficiency savings and represent a regional energy resource. The 2010 Action Plan assumed 60 aMW of energy efficiency would be achieved through non-programmatic energy efficiency. Total savings achieved through non-programmatic will not be reported until the end of the 6th Plan period, but preliminary results for 2010 indicate 15 aMW of non-programmatic energy efficiency occurred, and further analysis indicates that a total of 70 aMW of energy efficiency will likely occur over the five-year period. Table 6 outlines the updated planning estimates for non-programmatic savings through 2014.

Table 6. Annual Non-programmatic savings projections

Year	Non-programmatic Savings (aMW)
2010	15
2011	14
2012	14
2013	14
2014	13
Total	70

MARKET-INDUCED ADOPTION

The bulk of non-programmatic energy savings occur through market-induced adoption of energy efficiency measures and practices for which BPA and customer utilities pay no reimbursement. Drivers for market adoption include tax credits, social and environmental pressures, influence from previous or current utility activities (i.e., spillover) and end-user economic considerations. The research plan to quantify these savings is located in the report "Methodology for Quantifying Market-Induced, Non-programmatic Savings"[14].

[14] www.bpa.gov/energy/n/reports/evaluation/multi_sector/

CODES AND STANDARDS

All Northwest states have recently updated their energy codes. Since the Council assumes in its load forecast only codes and standards that have been signed into law when a power plan is being developed, the latest code updates are not included in baseline assumptions for the 6th Power Plan.

The estimated savings from updates to codes and standards is approximately 4 aMW. Of that, 2.3 aMW is attributable to the EPACT 2009 amendment for commercial lighting. The remainder of the savings is estimated from updates to codes and standards, which are based on state forecasts. A percentage of the total savings was applied to BPA's sector-level energy efficiency potentials and prorated based on when codes were adopted.

2.3.3. Market Transformation

One of NEEA's core objectives is to develop and deliver initiatives to capture savings associated with market transformation. Supported with BPA funding, as well as funds from public and investor-owned utilities throughout the region, NEEA has been leading this effort in the Northwest since 1997. NEEA's contribution is critical to achieving the region's collective energy efficiency targets. From 2010 to 2014, BPA will fund approximately 35 percent of NEEA's five-year operating plan, while large Utility Customers, including Snohomish PUD, Seattle City Light, Eugene Water and Electric Board and Clark PUD, will together contribute another eight percent of the funding.

Table 7 below shows the net savings[15], above the 6th Power Plan baseline, expected from 2010 through 2014 from NEEA's existing and new initiatives.

[15] Savings are net of utility programs and above the 6th Power Plan baseline. To allocate savings between NEEA net effects and non-programmatic savings, BPA used the ratio of 2010 NEEA net market effects above the NEEA baseline *to* total market savings, i.e., 33/103 aMW or 32% .These savings approximate the additional savings provided by NEEA above the 6th Power Plan baseline.

Table 7. Public Power Share of NEEA Savings Above the 6th Power Plan Baseline (aMW)

Year	Net market effects - aMW (BPA-estimated)
2010	11
2011	11
2012	8
2013	8
2014	8
Total	**46**

2.3.4. Carryover

Analysis of the savings potential under the 6th Power Plan was conducted in advance of the Power Plan's release and effective date in February 2010. As a result, there is a gap in savings acquisitions that occurred between when the baseline and savings potential were established in early 2009 and when the 6th Power Plan was published. BPA is carrying over only those savings achieved during this gap in time, i.e., between early 2009 and February 2010.

The carryover is 34 aMW of savings achieved during the 5th Power Plan that will be credited toward the target in the 6th Power Plan. These savings include only retrofit measures.[16] There are four areas of efficiency activities that BPA has identified that meet the criteria for reporting as carryover savings: commercial lighting, residential specialty CFLs, industrial refrigeration and grocery refrigeration.

[16] Retrofit savings are savings that can be acquired at any time period. Carryover does not include any lost-opportunity savings since those are savings that can only be acquired in the time that they are available, either through new construction or major renovation.

PROGRAMMATIC SAVINGS: SECTOR STRATEGIES AND OPPORTUNITIES

The work of BPA's Energy Efficiency department is carried out by six sector-specific divisions, each managed by a sector lead. The lead is responsible for developing and implementing a strategy for the sector that includes programs and measures capable of delivering the savings potential specified by the Council in its Power Plan. The sector staff interacts extensively with utilities and manages third-party program delivery contracts; oversees all internal BPA initiative operations; and collaborates with the marketing, planning and engineering departments to address opportunity needs and ensure future measures are in the pipeline. Sector staff also collaborates with NEEA and other stakeholders. The following five delivery mechanisms support sectors in developing opportunities for efficiency savings:

Deemed measure reimbursement. The RTF establishes and approves unit energy savings (UES) values for measures. BPA uses these savings values and sets reimbursements to Customer Utilities based on a willingness-to-pay process which accounts for the RTF-approved incremental cost of the measure, first-year cost to BPA to acquire the savings, the levelized cost over the lifetime of the measure savings and market conditions. Customer Utilities choose the incentive level to reimburse end-use customers; they can mix-and-match approved measures to create programs that best suit their consumers and service area.

Deemed calculated savings. For measures that lend themselves to relatively straight-forward calculation but require site-specific information for appropriate savings estimation (e.g., commercial lighting), BPA provides Customer Utilities a calculator tool. The tool calculates savings of measure applications. Reimbursement levels are typically based on the number of measures installed (per unit reimbursement) rather than estimated kWh savings, as with most deemed measures.

Custom projects. BPA supports installation of cost-effective measures or projects not eligible for deemed reimbursement through a custom projects offering. To implement custom projects, Customer Utilities and End-users submit proposals, along with M&V plans, for BPA engineering review and approval. In some cases, BPA approval is required before a project is implemented and in other cases, BPA approves or disapproves a project after project completion (referred to as Option 1 and Option 2, respectively).

Third-party programs. BPA contracts with third-parties to administer and manage programs that target specific markets or can benefit from delivery on a regional scale. The third-party typically provides all products and services required for the program, which may include marketing, technical support, direct installation of measures, participant and savings tracking, and rebate processing.

Upstream incentives/market transformation. In the Northwest, NEEA is the primary regional lead for "upstream" initiatives and market transformation. BPA collaborates with NEEA to identify and prioritize market transformation activities and along with utilities and stakeholders, provides funding to support them. Upstream initiatives and market transformation activities seek to influence manufacturer, dealer, retailer, or consumer behavior toward specific energy efficient technologies. They may include research, development and demonstration of emerging technologies and interventions to transform the market. NEEA tracks energy savings from its activities and reports them to BPA.

2.4. Programmatic Savings Summary

The programmatic savings summary shown in Table 8 includes actual 2010 savings, estimated 2011 savings and projected 2012-2014 savings. BPA's planning and programs staff forecast future savings by analyzing the historic Energy Savings achievements, reviewing trajectories of existing activities and identifying new opportunities, as well as areas of savings adjustment. In 2010 and 2011, BPA and its Customer Utilities achieved Energy Savings that exceeded targets set for annual saving acquisitions. As a result, savings targets in 2012-2014 are recalibrated so over-all five-year savings achieve the public power target of 504 aMW.

Table 8. Total Annually Reported Programmatic Savings (aMW)[17]

	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 **Total**
Portfolio	**80**	**107**	**62**	**56**	**51**	**356**
By Sector						
Residential	31	39	28	25	21	**143**
Commercial	24	26	18	15	11	**94**
Industrial	14	30	7	7	8	**67**
Agriculture	8	9	5	5	5	**32**
DSEI	0	1	1	2	2	**5**
Federal	3	3	3	3	3	**15**

2.4.1. Adjustments since the 2010 Action Plan

Programmatic savings have been updated from the 2010 Action Plan. The most significant adjustments are the result of the following four factors:

- BPA and Customer Utilities surpassed the 2010 and 2011 programmatic savings target from the 2010 Action Plan by 34 aMW, capturing greater amounts of less expensive savings than was originally anticipated. This over-achievement has resulted in a recalibration of savings in years 2012-2014, and reduced costs for savings acquisition.

- Residential savings projections have increased due to the extension of savings for standard compact fluorescent lamps (CFLs) in the 2012-2013 period.

- Commercial savings projections have been recalibrated in the 2012-2014 period due to the transfer of commercial lighting savings to code (which will be counted as non-programmatic savings in the future).

[17] Savings reported annually include one-year measure-life savings acquired year by year; savings reported toward the 6th Power Plan target include only one-year measure-life savings achieved in 2014.

- Commercial savings projections have been adjusted to account for a reduction in the amount of savings expected from HVAC and emerging technologies.

- In 2010 and 2011, the Energy Smart Industrial program delivered strong savings achievements; in 2012-2014, the programmatic savings projections have been changed due to budget adjustments.

- As noted previously, savings projections from Distribution System Efficiency (DSE) have been reduced due to slower-than-expected ramp-up and program development.

2.5. Programmatic Costs

The staff in each sector estimated costs by examining historical and projected reimbursement levels. In addition to reimbursements, staff included program delivery and administrative costs to reach the total needed to achieve the savings targets.

To align with BPA's Integrated Resource Program (IPR), the analysis for this 2012 Update includes only the capital costs of implementation (reimbursements, performance payments and third-party implementation). The total capital budget for energy efficiency for 2010-2014 is $459 million dollars. The analysis does not include expense items, including research, staffing (BPA or contract), state and tribal grants for low-income weatherization, legacy, debt service, database development, evaluation and market research, non-programmatic savings tracking or NEEA funding costs. Expenses will continue to be tracked through a newly implemented system for all EE budgets.

Table 9 displays, for the BPA portfolio and each sector, total programmatic costs (BPA and utility-funded) by year for the period 2010-2014. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh); millions of dollars per average megawatt ($M/aMW); and levelized cost over the lifetime of the savings (levelized $/kWh). The table reflects total regional cost to achieve BPA's share of *programmatic* savings needed to reach the 6th Power Plan target (356 aMW), as well as the amount Customer Utilities are expected to self-fund. For that reason, the numbers do not match the $459 million capital budget funded directly by BPA. The table also includes the costs associated with the conservation rate credit (CRC) from 2010 and 2011 savings acquisition.

Table 9. Total and Average Programmatic Costs ($ Millions) – BPA and Customer Utility Funded

	$ Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/MWh)
	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total	2010-2014	2010-2014	2010-2014
Portfolio	**$ 137.4**	**$ 163.5**	**$ 121.7**	**$ 118.0**	**$ 120.8**	**$ 661.4**	**$ 0.21**	**$ 1.9**	**$ 37.27**
By Sector									
Residential	$ 47.8	$ 76.4	$ 60.4	$ 61.2	$ 68.9	**$ 314.6**	**$ 0.21**	**$ 1.8**	**$ 50.04**
Commercial	$ 43.5	$ 34.6	$ 33.0	$ 27.5	$ 18.4	**$ 157.0**	**$ 0.20**	**$ 1.8**	**$ 17.66**
Industrial	$ 30.4	$ 35.1	$ 15.2	$ 15.9	$ 18.4	**$ 115.0**	**$ 0.24**	**$ 2.1**	**$ 28.92**
Agriculture	$ 10.4	$ 9.3	$ 5.0	$ 3.9	$ 5.1	**$ 33.7**	**$ 0.17**	**$ 1.4**	**$ 60.04**
DSEI	$ 0.7	$ 0.7	$ 2.0	$ 3.3	$ 4.0	**$ 10.7**	**$ 0.24**	**$ 2.1**	**$ 16.67**
Federal	$ 4.8	$ 7.4	$ 6.1	$ 6.1	$ 6.1	**$ 30.5**	**$ 0.22**	**$ 1.9**	**$ 34.00**

Table 10 provides the BPA funded only costs for programmatic savings toward the 6th Plan target. Total capital costs for BPA funded savings totals $459 million dollars over the five year period. In 2010 and 2011, $53 million dollars of Conservation Rate Credit (CRC) expenses were also spent; resulting in total BPA funded programmatic dollars of $512 million dollars.

Table 10. BPA Funded Costs ($ Millions) - CRC and Capital

BPA Funded Costs 2010 - 2014						
	2010	**2011**	**2012**	**2013**	**2014**	**Total**
CRC	$41	$12	$0	$0	$0	**$53**
Capital	$58	$162	$89	$75	$75	**$459**
Total	**$99**	**$174**	**$89**	**$75**	**$75**	**$512**

2.5.1. Adjustments since the 2010 Action Plan

Programmatic costs have been updated from the 2010 Action Plan. The most significant adjustments are the result of the following four factors:

- The 2010 Action Plan included both expense and capital costs. The 2012 Action Plan now reflects only capital-related BPA and utility self-funded expenditures. As a result, total and average costs appear reduced from 2010. The expenditures on expense items, such as research and development (R&D) or program development, are still included in BPA's budgeting process, but are not addressed in this document, and will be reported through Energy Efficiency's

new budget tracking system, EE Tracker. In addition, the Emerging Technology budget was moved from the Energy Efficiency department to the Technology Innovation department.

- Projects in the federal sector now fall under standard custom projects and reimbursement rates, which has lowered the cost to acquire those savings.
- CFLs will continue to provide low-cost savings through 2013, which reduces overall portfolio acquisition costs.
- The updated savings estimates for DSEI reduce total and average program costs.

The following sections of the 2012 Update provide detail on projections of energy savings and costs for each sector, as well as program efforts to achieve the 6th Power Plan targets.

2.6. Residential Sector Strategy

The residential sector aims to strike a balance between offering measures that deliver the highest savings potential and providing a diversity of measures to meet the needs of BPA's Utility Customers. Residential sector opportunities consist primarily of RTF-recommended deemed measures and regional infrastructure support, in key areas such as retail lighting and showerheads with Simple Steps, Smart Savings™; and HVAC support through Ductless Heat Pumps (DHPs); and Performance Tested Comfort Systems (PTCS)™.

A single residential-sector measure may be distributed through multiple mechanisms. For example, CFLs are promoted through midstream promotions (retail markdowns), direct mail and direct installation programs. Customer Utilities select the measures they find most appropriate and bundle them into End-user programs. In some cases, utilities supplement BPA's reimbursements or add their own measures to enhance program offerings to End-users.

NEEA's market transformation activities are a key component of total residential savings for BPA's portfolio. NEEA's current strategies include market transformation activities in consumer electronics (initially high-definition TVs and other home electronics), ductless heat pumps, residential lighting and new home construction. NEEA plans to continue to provide training and education to participants in the residential new construction market and pursue more aggressive residential building codes and standards, while broadening its scope to take advantage of the multiple green building brands (e.g., LEED, Built Green) that have recently gained recognition in the new homes market.

2.6.1. Accomplishments

Table 11 below presents the energy efficiency savings goal for the residential sector and the progress toward meeting it. As shown, the goal is 143 aMW; the savings achieved in 2010 and 2011 are 70 aMW; and the projected 2012-2014 savings estimate is 74 aMW. The program goal excludes residential-sector savings from non-programmatic activities and from NEEA's market transformation efforts.

Table 11. Residential Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	144
Achieved 2010/2011 Savings	70
Projected 2012-2014 Savings	74

2.6.2. Savings Estimates, Budgets and Performance Metrics

Table 12 provides estimates of annual energy savings expected from key residential sector opportunities, including existing activities and planned new ones. A detailed listing of measure-level savings estimates for this sector is provided in Appendix A.

Table 12. Sector Savings by Opportunity (aMW)

Opportunity	aMW					
	2010 Actual	**2011** Estimated	**2012** Projected	**2013** Projected	**2014** Projected	**2010-2014 Total**
Lighting	20	23	16	12	4	**75**
Heating and Cooling - HVAC	3	6	3	4	6	**22**
Heating and Cooling - Envelope	3	5	5	5	5	**23**
Refrigeration - Appliances*	2	2	1	1	1	**8**
Water Heating - Appliances**	2	2	2	2	2	**9**
Water Heating - Other^	0	0	-	-	-	**0**
Electronics^^	-	-	-	-	-	**-**
Efficient Homes (New Homes)	1	1	1	1	1	**5**
Behavioral	-	-	-	-	1	**1**
Total	**31**	**39**	**28**	**25**	**21**	**144**

*refrigerators, freezers, appliance decommisioning

**clothes washers, showerheads, water heaters, heat pump water heaters

^pipe insulation, water heat recovery

^^savings reported through NEEA

Table 13 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW) and the levelized cost over the lifetime of the savings (levelized $/MWh) for the total five-year time period.

Table 13. Total Sector Costs by Opportunity ($M) and Cost Metrics

Opportunity	$Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/MWh)
	2010	2011	2012	2013	2014	Total	2014	2014	2010-2014
Lighting	$15.6	$16.3	$12.7	$9.7	$3.4	**$57.7**	**$0.09**	**$0.79**	**$21.54**
Heating and Cooling - HVAC	$13.4	$34.6	$25.7	$27.9	$38.3	**$139.8**	**$0.45**	**$3.91**	**$105.89**
Heating and Cooling - Envelope	$9.9	$14.0	$13.2	$13.2	$15.5	**$65.8**	**$0.33**	**$2.91**	**$78.86**
Refrigeration - Appliances*	$2.4	$3.5	$2.3	$2.3	$2.3	**$12.8**	**$0.18**	**$1.59**	**$43.05**
Water Heating - Appliances**	$3.4	$3.7	$2.6	$2.9	$3.3	**$15.9**	**$0.19**	**$1.68**	**$45.39**
Water Heating - Other^	$0.0	$0.0	$0.0	$0.0	$0.0	**$0.0**	**$0.24**	**$2.12**	**$57.39**
Electronics	$0.0	$0.0	$0.0	$0.0	$0.0	**$0.0**	**NA**	**NA**	**NA**
Efficient Homes (New Homes)	$3.1	$4.4	$3.9	$5.1	$5.1	**$21.6**	**$0.47**	**$4.10**	**$110.98**
Behavioral	$0.0	$0.0	$0.0	$0.0	$1.0	**$1.0**	**$0.23**	**$2.01**	**$54.60**
Total	**$47.8**	**$76.4**	**$60.4**	**$61.2**	**$68.9**	**$314.6**	**$0.21**	**$1.85**	**$50.04**

*refrigerators, freezers, appliance decommisioning

**clothes washers, showerheads, water heaters, heat pump water heaters

^pipe insulation, water heat recovery

^^savings reported through NEEA

2.6.3. Adjustments since the 2010 Action Plan

Residential sector savings have been updated from the 2010 Action Plan. The most significant adjustments are the result of the following:

- BPA will continue to achieve savings from standard CFLs through 2013. The savings will, however, be at lower levels than in 2010 due to a reduction in RTF-approved unit energy savings (UES) that were based on updated assumptions about hours of use and Energy Independence and Security Act of 2007 (EISA) baseline changes.

- NEEA will continue to take the lead in capturing savings associated with consumer electronics through their Consumer Electronics initiative focusing on more efficient televisions. .

- The 2010 Action Plan expected Heat Pump Water Heaters (HPWH) would be program-ready in fiscal year 2011. The RTF approved HPWH savings for integrated HPWHs in fall 2011, and BPA is on track to offer program support for integrated HPWHs (Tier 1) in the spring of 2012. NEEA is expected to present a data and upstream program strategies to support ducted (Tier 2) HPWH to the RTF in the spring of 2012.

- BPA has added a new opportunity, Behavioral, to its list of projected savings. Behavioral measures are currently offered only through a custom program path, but development has begun on measures of more general application. Savings associated with these measures are expected to start in 2014.

2.6.4. Achieving the Savings

OVERVIEW OF EXISTING ACTIVITIES

Current residential sector strategies are organized into broad categories, with delivery focused primarily on deemed measures implemented by Customer Utilities and third-party contractors. Current residential opportunities occur in the categories described below:

Residential Lighting: Over the past several years, residential lighting measures have focused on promoting both standard and specialty screw-in CFLs through retail markdowns, direct-mail and direct-installation programs. With the enactment of EISA, savings from CFLs will be reduced as the efficiency baseline for standard CFLs is adjusted. Both types of CFLs will, however, remain cost-effective energy efficiency measures. Considerable potential for CFL savings remains across the region, particularly in rural, multifamily and low-income households. BPA will also continue its focus on specialty CFLs, while expanding efforts with ENERGY STAR fixtures and light emitting diodes (LEDs) as quality cost-effective residential applications become available. Program delivery will continue through a combination of retail promotion, direct-mail and direct-installation efforts as discussed below.

Simple Steps, Smart Savings™: Building upon the successful regional Change a Light CFL promotion (2006-2010), BPA expanded this regional retail model to include

specialty CFLs, high-efficiency light fixtures, low-flow showerheads, LEDs and more. Delivery mechanisms were diversified to meet a wider utility audience, including:

- **Retail Promotion**: Retail coordination continues to be a valuable arena for the promotion of energy efficient products. BPA's contractor, Fluid Market Strategies, expanded upstream opportunities to encourage residential consumers to purchase and install high-quality energy efficiency measures.

- **Direct Mail:** Direct-mail CFLs provide Customer Utilities, particularly those in rural areas, with the ability to deliver an easy-to-install energy efficiency measure directly to their customers. October 2010 non-requested direct mailed CFLs were limited to four CFLs per household per year to support savings assumptions.

- **Direct Installation**: Direct-installation programs provide opportunities to connect with End-users, install low-cost efficiency measures, obtain basic energy audit data, and educate end-users on energy efficient behaviors and other available savings opportunities. BPA will continue to encourage Customer Utilities to leverage these opportunities through third-party, turn-key program or utility-delivered models. BPA will work with Customer Utilities to encourage links to weatherization and equipment retrofit opportunities.

Refrigeration Appliances & Water Heating Appliances: BPA offers a deemed reimbursement for ENERGY STAR qualified clothes washers, refrigerators and freezers, as well as refrigerator/freezer decommissioning, efficient electric resistance storage water heaters and heat pump water heaters. Additionally, BPA is working to improve End-user marketing materials, and to improve connections with major store chains to drive increased uptake of efficient appliance measures. As resources allow, BPA will explore opportunities to improve refrigerator/freezer decommissioning programs by helping build capacity among solid waste removal companies to manage appliance pick-up and storage in rural areas, and expanding the program to include clothes washers.

Consumer Electronics: In late 2008, BPA collaborated with the Energy Trust of Oregon and Puget Sound Energy to encourage NEEA to pursue consumer electronics as its next major area for residential market transformation activities. In July 2009, NEEA launched a consumer electronics initiative, focusing initially on televisions 30 percent above ENERGY STAR with upstream market incentives directed at manufacturers. BPA will continue to work with NEEA to add electronics measures with strong energy savings potential, such as personal home computers, computer monitors, set-top boxes, game consoles and DVD players.

Heating and Cooling (Envelope): BPA's current weatherization measures include insulation, windows and air sealing. The reimbursement on prime window replacement was increased in 2009 to help stimulate the window retrofit market. Since then, participation in window replacement has increased dramatically; however, considerable untapped potential savings are still available through residential weatherization. In 2011, the RTF recommended new weatherization specifications, increasing requirements for oversight by utilities. BPA is working to build-out communication, marketing and programs tools to assist utilities through the transition to the new specifications and to help achieve weatherization savings across the region. Over the coming years, BPA will explore alternative delivery mechanisms for weatherization and air sealing, emphasizing simplified, sample-based verification procedures; work to link weatherization to direct

install efforts; increase marketing and outreach; and consider implementing a quality contractor network as a model to lower delivery costs and maintain quality.

Heating and Cooling (HVAC): BPA's residential HVAC deemed measures include Performance Tested Comfort Systems™ (PTCS) high-efficiency air-source heat pump upgrades and conversions, PTCS ground-source heat pumps, duct sealing with PTCS protocols, and ductless heat pumps (DHPs) in single-family homes with zonal electric heat. PTCS is a training, certification and quality assurance program for installation and repair of ducted heating and cooling systems. Additionally, BPA is currently reviewing savings potential and cost-effectiveness of prescriptive duct sealing and is conducting research to expand potential applications for DHPs. As part of Residential Sector marketing support, BPA is developing consumer and contractor-focused marketing materials to support utilities' HVAC efforts.

Efficient Homes: NEEA leads the region's efforts in residential new construction through its Northwest ENERGY STAR Homes program. Over the past year, BPA worked with NEEA to broaden the scope of energy efficient homes to incorporate green building programs like Built Green™ and LEED that meet ENERGY STAR specifications, as well as create measures to allow utilities to market and claim the previously unreported electric savings from ENERGY STAR gas-heated homes.

Manufactured Homes: BPA has historically been very involved in promoting energy efficient manufactured housing through Super Good Cents, the Manufactured Home Acquisition Program (MAP) and Northwest Energy Efficient Manufactured Homes (NEEM). The recent economic downturn negatively affected the manufactured homes market, derailing financing and forcing plant closures across the region. In 2009, the Oregon Department of Energy, the primary sponsor of NEEM, eliminated the staff positions that supported NEEM. In 2011, BPA launched an effort to reassess the savings potential and options for rebuilding regional support for NEEM, as well as other ways to support energy efficiency in manufactured homes. These activities include research opportunities for increasing the efficiency of lighting fixtures and heating systems in manufactured housing and establishing protocols so savings are consistently measured, reported and tracked.

Tribal and State Low Income Public Purpose Program: BPA's public purpose program provides $4.5 million per year in funding to the states of Idaho, Montana, Washington and Oregon to distribute through Community Action Program (CAP) agencies. With this funding the CAP agencies implement the Federal Weatherization Assistance Program (WAP) and the Low Income Energy Assistance Program (LIHEAP) to qualifying low income households in BPA's service territory.

Additionally, in order to assure that low income tribal populations are directly served by BPA's public purpose program, since 1999 BPA has provided $500,000 per year of direct funding to approximately 17 Columbia River Basin Tribes. With these grants, tribes are able to provide training, materials, labor and equipment for weatherizing low income tribal residences. This allows tribes the opportunity to employ local tribal residents to become auditors and contractors and to establish their own independent tribal low income weatherization programs. BPA's public purpose grants also provide funding to low income households for some additional energy efficient measures including refrigerators, clothes washers and CFLs. These measures can be installed independently of the weatherization work, which allows a greater diversity of tribal residents to be served through BPA's program.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH ACTIVITIES

The residential sector works continuously to pursue new programs and technologies, as well as improve existing programs to boost the energy savings potential of BPA's utility customers. New strategies will focus on accelerating the adoption of energy efficient products and increasing penetration in hard-to-reach market segments. BPA continues to research new technologies and program opportunities that can generate savings and fill its measure pipeline throughout the five-year plan period. The research initiatives are outlined below.

Multifamily: According to the 6th Power Plan, the multifamily sector has 5.4 aMW of untapped weatherization energy efficiency potential over five years. Although implementing energy efficiency programs in multifamily housing is particularly challenging, BPA's residential program staff feels it is important to begin to address this market segment as quickly as possible. To do so, BPA will embark on a multi-phased approach: (1) in the short term, target multifamily housing for residential lighting and showerhead direct-installation programs, in particular, to capitalize on early savings potential available from CFLs; (2) conduct high-level research on delivery best practices and appropriate target measures for multifamily programs; (3) evaluate the need for a qualified third-party program delivery partner; and (4) assess the savings potential and design and launch efforts to target multifamily properties with weatherization, space heating, water heating, lighting and plug load measures. BPA will also examine the potential for applying appropriate commercial equipment opportunities to large multifamily housing buildings. Multifamily savings is not explicitly shown in the savings tables above, but is included within the various end-uses which apply, including lighting, HVAC, Envelope, Water Heating and Refrigeration.

New Measures: New residential measures are considered as opportunities arise and data become available. In most cases, priority is given to those opportunities with accessible data, strong potential for savings and program or market readiness. This work is usually managed using a program partner/consultant, managed by BPA's Planning and Evaluation Department.

Behavioral: In response to a growing interest in behavior-based conservation opportunities, BPA has launched efforts to provide support to the region in this area. See Section 3.5 for more information on this multi-sector opportunity.

Emerging Technologies Research: The E3T team continues its work to assess new residential technology applications as they are identified. Current focus areas include:

- **Ductless Heat Pumps (DHP) Single Family zonal**: In 2009, NEEA and BPA launched a regional pilot for single-family homes (zonal heat and forced-air furnaces) to collect and provide data to the RTF for developing a deemed savings value for DHPs. Draft analysis on these units will be available in 2011, with a final report in late 2012.

- **DHPs in other applications**: BPA's energy efficiency engineering team is currently exploring additional applications for DHPs through metered engineering pilots for single-family and manufactured homes with electric forced-air furnaces and in small commercial buildings to determine if these applications generate energy savings.

- **Heat Pump Water Heaters (HPWHs)**: From 2010-2011, BPA's pilot testing of the first integrated HPWHs from three major water heater manufacturers helped significantly accelerate cost-effective opportunities for this technology in the region. BPA's in-situ field demonstration pilot, conducted in partnership with Snohomish PUD and the Electric Power Research Institute (EPRI), coordinates metering equipment in 40 homes (treatment sites) and metering equipment in an additional 10 homes (control sites) throughout the Pacific Northwest, capturing valuable real-time data. The purpose of this work is to provide documented performance feedback to utilities and stakeholders in the region to inform program planning for HPWHs.

Table 14 provides the estimated savings from emerging technology initiatives. These estimates are incorporated into the total sector savings estimates in Tables 6 and 7 above.

Table 14. Emerging Technologies Savings (aMW)

Initative	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total
Ductless Heat Pumps	1.4	2.9	3	4	5	16
Heat Pump Water Heater		0	0.1	0.1	0.2	0.4
Total	**1.4**	**2.9**	**3.1**	**4.1**	**5.2**	**16.7**

2.6.5. Overview of Market Barriers and Challenges

Table 15 outlines barriers unique to implementing energy efficiency measures in the residential sector and strategies for overcoming them.

Table 15. Residential Market Barriers and Mitigation Strategies

Barriers	Possible Mitigation Strategies
Lack of awareness on available incentives when End-users need emergency replacement.	– Work with Utility Customers on broad awareness activities. – Increase marketing and outreach to upstream actors: manufacturers, dealers, installers. – Support marketing and outreach to End-users.
Perceived 100% verification requirement by some utilities for weatherization measures.	– Release new weatherization rules that clarify verification requirements. – Create "approved contractor referral list" for insulation and air sealing and establish lower verification requirement for qualified installers.
Savings on direct installation and delivered measures difficult to document.	– Ensure program design specified measures are distributed by customer request (e.g., return postcard). – Use program partner to install products at select

	customer sites. – Conduct sample-based phone verification for direct installation program consumers.
Lack of End-user knowledge about high-efficiency options, how to go about making upgrades, available incentives.	– Provide utilities with materials focused on "what to do and what to know" for each opportunity, quality installation practices, available contractors, etc.
Small/rural utility logistical constraints to offering refrigerator recycling programs.	– Provide better information and incentives to trash haulers to persuade them to store refrigerators for monthly pick up by program partners.
Rural areas difficult to reach with market transformation initiatives.	– Research where/how consumers in rural areas purchase products and design a marketing strategy around these pathways.
Multifamily facilities over three stories considered "commercial," requiring a custom process.	– Carve out specific measures applicable to common multifamily applications (e.g., common area lighting) for multifamily program.
Multifamily market difficult to penetrate due to split incentive barrier (i.e., costs and savings accruing to different parties) and logistical complexities (e.g., shared walls, multiple units, leasing arrangements).	– Examine successful multifamily programs implemented by utilities in other jurisdictions. – Use a third-party program model and comprehensive delivery approach to overcome barriers.

2.6.6. Marketing Strategies and Tactics

A new marketing strategic plan is expected to benefit all energy efficiency sectors, particularly in the areas of communication with Utility Customers and outreach to trade allies; targeted marketing materials for End-users; and training for marketing staff. In addition, the residential sector will work with the marketing team to implement the following marketing initiatives to support opportunities:

- Develop customizable End-user, Utility Customer and third-party marketing materials for all opportunities.
- Improve point-of-purchase materials to assist consumers in selecting the right CFL, light fixture, LED, etc., for their needs.
- Improve connections with major chain stores and increase outreach, materials availability and dealer promotion.
- Explore ways to reach smaller, independently owned stores in rural regions.
- In the longer term, identify how consumers in rural areas make purchases (in areas where there are no chain stores) and develop marketing tactics that address these pathways.
- Develop and distribute a trade ally toolkit to help Utility Customers expand outreach and marketing to trade allies.
- Work with Utility Customers to implement outreach and cooperative advertising with trade allies and distribution channels, such as retailers, installers and contractors.

- Develop marketing tools that tell a story for energy efficiency representatives, and include case study examples showing investment dollars, targets, time period and savings.
- Develop marketing materials to specifically address the unique needs of multifamily properties and property managers.
- Develop marketing materials to specifically address the needs of Customer Utilities serving rural areas and their End-users.

2.7. Commercial Sector Strategy

Commercial sector energy efficiency potential exists in large, relatively accessible savings in lighting and also in other applications that are more diffused and are typically complex in terms of technology, delivery or both.

Throughout 2012, the commercial sector will focus on reinvestment in its large and successful lighting program in order to be in a position for robust savings acquisition in the years to follow. Federal standard changes, new technologies and increased interest in comprehensive retrofit opportunities all contribute to a changing landscape that requires significant program redesign. These changes must meet near-term challenges and lay the groundwork for next-generation lighting efficiency.

The existing grocery refrigeration program is reaching market maturity and BPA will focus on leveraging past investment to capture the remaining potential in this area. BPA will supplement these opportunities with new tactics to capitalize on savings related to HVAC and new construction, and to streamline acquisition of savings from custom projects. Additional research is planned to lay the groundwork for savings acquisition in more challenging areas during the 2013-2014 period.

In addition, during the remainder of the five-year Action Plan period, BPA will work closely with NEEA and ensure NEEA remains focused on priority market transformation opportunities. NEEA's redesign of its commercial sector places priority on lighting and existing building renewal along with building operations. BPA staff is actively engaged in supporting NEEA's work and ensuring program designs are well-suited to public utility needs.

2.7.1. Accomplishments

Table 16 presents the energy efficiency savings goal for the commercial sector and the progress toward meeting it. As shown, the goal is 94 aMW; the savings achieved in 2010 and 2011 are 50 aMW; and the projected 2012-2014 savings estimate is 44 aMW. The program goal excludes commercial sector savings from non-programmatic activities and from NEEA's market transformation efforts.

Table 16. Commercial Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	94
Achieved 2010/2011 Savings	50
Projected 2012-2014 Savings	44

2.7.2. Savings Estimates, Budgets and Performance Metrics

Table 17 provides estimates of annual energy savings expected from key commercial sector opportunities, including existing activities and planned new ones. A detailed listing of measure-level savings estimates for this sector is provided in Appendix A.

Table 17. Sector Savings by Opportunity (aMW)

Opportunity	aMW					
	2010 Actual	**2011** Estimated	**2012** Projected	**2013** Projected	**2014** Projected	**2010-2014 Total**
Lighting	12.31	13.00	10.30	6.50	6.60	**48.71**
HVAC	3.12	3.50	2.55	3.05	3.55	**15.78**
Envelope	0.06	0.03	0.03	0.04	0.05	**0.20**
Electronics	0.21	0.30	0.21	0.26	0.41	**1.39**
Grocery Refrigeration	4.95	5.02	4.02	4.02	0.02	**18.01**
Water Heat	0.00	0.01	0.10	0.05	0.10	**0.26**
Motors/Drives	0.05	0.08	0.04	0.04	0.04	**0.24**
Cooking/Food Preparation	0.01	0.01	0.01	-	-	**0.02**
Commissioning	-	-	-	0.10	0.25	**0.35**
Other Commercial	3.18	3.87	0.50	0.50	0.50	**8.55**
Total	**24**	**26**	**18**	**15**	**12**	**94**

Table 18 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW); and the levelized cost over the lifetime of the savings (levelized $/MWh) for the total five-year time period.

Table 18. Sector Costs by Opportunity ($M) and Cost Metrics

Opportunity	$Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/MWh)
Opportunity	**2010**	**2011**	**2012**	**2013**	**2014**	**Total**	**2010-2014**	**2010-2014**	**2010-2014**
Lighting	$ 19.04	$ 15.84	$ 17.98	$ 11.07	$ 11.22	**$ 75.15**	**$ 0.18**	**$ 1.62**	**$ 19.03**
HVAC	$ 4.29	$ 4.07	$ 3.51	$ 4.20	$ 4.89	**$ 20.97**	**$ 0.16**	**$ 1.38**	**$ 16.17**
Envelope	$ 0.07	$ 0.03	$ 0.05	$ 0.71	$ 0.10	**$ 0.96**	**$ 0.21**	**$ 1.88**	**$ 22.11**
Electronics	$ 0.18	$ 0.23	$ 0.15	$ 0.14	$ 0.18	**$ 0.87**	**$ 0.07**	**$ 0.63**	**$ 7.38**
Grocery Refrigeration	$ 11.85	$ 12.02	$ 9.81	$ 9.81	$ 0.03	**$ 43.51**	**$ 0.28**	**$ 2.42**	**$ 28.39**
Water Heat	$ 0.00	$ 0.02	$ 0.16	$ 0.08	$ 0.16	**$ 0.42**	**$ 0.18**	**$ 1.61**	**$ 18.90**
Motors/Drives	$ 0.08	$ 0.06	$ 0.06	$ 0.06	$ 0.06	**$ 0.32**	**$ 0.18**	**$ 1.58**	**$ 18.60**
Cooking/Food Preparation	$ 0.01	$ 0.01	$ 0.01	$ -	$ -	**$ 0.03**	**$ 0.18**	**$ 1.84**	**$ 21.65**
Commissioning	$ -	$ -	$ -	$ 0.20	$ 0.50	**$ 0.71**	**$ 0.23**	**$ 2.01**	**$ 23.68**
Other Commercial	$ 7.96	$ 2.34	$ 1.25	$ 1.25	$ 1.25	**$ 14.04**	**$ 0.29**	**$ 2.50**	**$ 29.37**
Total	**$ 43.48**	**$ 34.61**	**$ 32.97**	**$ 27.52**	**$ 18.39**	**$ 156.97**	**$ 0.20**	**$1.78**	**$ 17.66**

2.7.3. Adjustments since the 2010 Action Plan

The updated commercial sector savings and costs reflect changes due to several factors. The most significant adjustments are the result of the following:

- In order to capitalize on the continuing opportunity in grocery refrigeration efficiency, BPA intends to continue the BPA Energy Smart Grocery program though 2013, at somewhat lower levels than in 2010-11.
- Savings estimates in commercial HVAC have been reduced to reflect slower than expected measure development.
- Third-party acquisition of savings from Network Computer Power Management (NEEA's 80+ program) has been eliminated.

2.7.4. Achieving the Savings

Overview of Existing Activities

The commercial sector's two cornerstone energy efficiency opportunities, commercial lighting and refrigeration through Energy Smart Grocer, are mature and generate the majority of the sector's savings. In the next several years, changes to current commercial opportunities will focus on simplifying participation for Utility Customers and adding new measures to capture untapped savings potential. Commercial sector opportunities, with planned changes, are outlined below.

Commercial Lighting: Commercial lighting is the commercial sector's largest initiative. It is utility-delivered and supported by a deemed savings calculator tool and a third-party managed Trade Ally Network (TAN). The TAN assists Utility Customers in designing programs and supports implementation by conducting contractor training, helping contractors and End-users access and navigate utility programs, and directly supporting project development. Though the offer has expanded markedly over the last three years, the core design of the lighting program has been in place since its launch in 2002. While the program has been very successful, changing federal lighting standards, the emergence of new technologies, and growing interest in comprehensive retrofits will increasingly require new approaches.

In 2012, BPA will continue to support utility programs through the existing deemed offer. At the same time, alternative approaches to better address the changing landscapes will be explored and developed in cooperation with customers, with planned launch in 2013. BPA will continue to support trade allies and utilities through investment in TAN and will remain committed to adding new technologies to the program as they become market ready.

Grocery Refrigeration: BPA has been implementing its Energy Smart Grocer program through a contract with PECI, its third-party program delivery contractor. Now in its fifth year, the program is well-established and positioned to maintain market acquisition momentum. In response to guidance from Utility Customers, BPA is continuing the program for an additional two years at a scale consistent with its remaining potential. The new contract entails process differences consistent with the post-2011 policy framework in which utilities will fund savings using their Energy Efficiency Incentive (EEI) account or other funding (the program previously operated under a direct acquisition

framework in which BPA funded all incentives). A strategy for investment in this market after 2013 will be informed by performance over the next two years.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH

The commercial sector staff works continuously to pursue new programs and technologies, as well as improving existing program offers to boost the energy savings potential of Utility Customers. New strategies will focus on accelerating the adoption of energy efficient products and increasing penetration in hard-to-reach market segments.

HVAC: Efficient HVAC technologies identified in the 6th Power Plan are the single largest relatively untapped source of savings in the commercial sector. Over the past several years, BPA has developed new offerings for premium efficiency rooftop AC and DHPs in commercial spaces using the BPA-Qualified evaluated approach, in which initial savings estimates are confirmed and adjusted through periodic program evaluations. While this approach has opened new areas of opportunity to customers, the offer remains a work in progress. These measures, many of which remain available only as custom projects, result in a highly variable savings profile across diverse installations. In order to improve customer access to these measures, BPA is actively pursing standardization of offerings, where appropriate, by structuring them as either prescriptive measures or calculated offerings. This effort will launch an expanded ductless heat pump measure and heat pump calculator in 2012 and will be expanded incrementally to include other measures.

Custom Projects: The custom project path offers a reimbursement for commercial projects that do not incorporate deemed measures, including many HVAC systems, building shell projects or specific small commercial applications. Because such projects tend to be complex and the measure applications and savings vary across building types and uses, few of these technologies have become deemed measures. Developing custom projects is often complex and as a consequence, participation has been low. To address this barrier and increase participation in a broader variety of measures, BPA will generally pursue migration of these opportunities to standardized approaches under the RTF deemed or BPA Qualified framework.

In cases where it is impractical or not cost-effective to deem certain technologies, BPA has identified the need for a customer-implementable deemed calculated approach to streamline the custom project process and standardized calculations methodologies for use by BPA's internal engineers. BPA plans to work towards developing a set of "deemed calculator tools" to simplify custom measure installation, with implementation processes tailored to the opportunity. Finally, for those measures for which a fully custom approach is the only solution, BPA will strive to streamline the process and increase transparency.

Channel Development: The primary focus of recent new program development in the commercial sector has been on establishing reimbursements for new measures. In order to help customers succeed in operating programs targeting these measures, BPA is exploring how to best support the delivery of these measures in the market. Given the focus on HVAC, BPA will consult its customers about establishing a trade ally network or similar program support infrastructure. To address the broader opportunity for commercial sector custom projects, a resource to support project development through energy audits and direct customer marketing is also under consideration. Targeted marketing campaigns will also be explored where promising opportunities exist.

Hospitality and Commercial Kitchens: In 2010, BPA developed and launched a new suite of deemed commercial cooking measures. While they are generally offered to customers "a la carte," BPA encourages utilities to create a program package that combines measures to capture a larger range of opportunities in the hospitality and commercial kitchen market segments. BPA will support these efforts with materials and assistance to establish the market and create lasting opportunities.

Commercial Electronics: In the coming years, BPA will continue to support NEEA as it pursues market transformation opportunities related to high-efficiency commercial electronic and plug load measures. In its 2010-2014 Business Plan, NEEA targets computers, monitors, imaging equipment, servers, and plug loads in data centers and other commercial applications. NEEA will work upstream with office equipment manufacturers, distributors and vendors to remove market barriers. NEEA also will develop decision-making tools, such as model specifications, business case templates and procurement policies. A measure for smart strips was recently deemed by the RTF and BPA will promote this measure with marketing support. In addition, BPA will pursue opportunities to develop deemed or BPA-qualified measures to address servers and plug loads in offices and server closets.

Commissioning: The 6th Power Plan has identified significant potential in existing building commissioning measures; however, commissioning projects pose considerable technological and implementation challenges that are difficult to overcome and require significant staff resources. BPA has begun assessing energy savings opportunities available through commissioning in larger commercial buildings. This research will include a review of utility commissioning programs to gain a deeper understanding of this opportunity and industry best practices for implementation. Beginning in 2012, BPA will evaluate the success of the new Energy Smart Industrial Energy Management Pilot, to determine whether it may be replicated in certain types of commercial buildings as a component of a commissioning approach.

New Construction: As a result of weak new construction markets and steadily improving codes and standards for new buildings, the potential for savings from new construction programs is low and not expected to increase measurably over the next few years. However, the potential could improve as the economy and new construction markets rebound. BPA will focus on restructuring Implementation Manual rules on new construction to clarify requirements for custom projects and leverage opportunities associated with the LEED accreditation process. Ongoing research into building codes will inform potential programmatic approaches.

New Measure Development: BPA will continue efforts to develop straightforward deemed measures conducive to turnkey offerings in the commercial sector. Expanded offerings in Smart power strips, showerheads, windows, insulation, and server-room measures are a focus of near-term research.

Emerging Technologies Research: Several new measures with potential in commercial sector applications are being evaluated by E3T. They include controls commissioning, demand-controlled ventilation, premium ventilation packages for rooftop packaged units, rooftop unit servicing/upgrades, smart monitoring and diagnostic systems for rooftop HVAC systems, variable refrigerant flow systems, energy management, integrated building design and perimeter daylighting controls.

Table 19 provides the estimated savings from emerging technology initiatives. These estimates are incorporated into the total sector savings estimates in Tables 11 and 12 above.

Table 19. Emerging Technologies Research to Market (aMW)

Initative	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total
Variable Capacity Heat Pump	0	0.1	0.3	0.4	0.4	**1**
Heat Pump: Ductless Mini-Split		0.1	0.3	0.3	0.3	**1**
VRF/Heat Pump			Pilot	0.1	0.1	**0.2**
Advanced Rooftop HVAC	0.05	0	0	0.1	0.5	**1**
Advanced RTU HVAC Pilot	0.05			0.1	0.5	**1**
HVAC Controls	0	0	0.1	0.4	0.6	**1.1**
Demand-Controlled Ventilation	Pilot	Pilot	0	0.3	0.4	**0.7**
Web-enabled Programmable Thermostats			0.1	0.1	0.2	**0.4**
Controls Commissioning						
LED Applications	0	0	0.01	0.2	0.6	**0.8**
Other LED		Pilot	0.01	0.1	0.5	**1**
LED Streetlighting		Pilot	Pilot	0.1	0.1	**0**
Adaptive Lighting			0	0	0	**0**
Total	**0.1**	**0.2**	**0.82**	**2.2**	**4.2**	**7.52**

2.7.5. Overview of Market Barriers and Challenges

Table 20 outlines barriers unique to implementing energy efficiency measures in the commercial sector and strategies for overcoming them.

Table 20. Commercial Market Barriers and Mitigation Strategies

Barriers	Possible Mitigation Strategies
End-users needing emergency replacement may not be aware of available incentives.	– Work with Utility Customers on broad awareness activities. – Increase marketing and outreach to upstream actors: manufacturers, dealers, installers. – Support marketing and outreach to End-users.
Computers and other office measures offer good potential, but the market is difficult to reach.	– Negotiate with NEEA to add new office measures to market transformation initiatives.
Variability in savings and cost-effectiveness make HVAC, building shell and small commercial measures difficult to deem.	– Research standardized applications for measures that are the easiest to implement and pursue RTF approval. – Develop deemed calculator tool for common measures with variable applications.
Marketing is not engaged in the sales	– Offer incentives directly to trade allies.

and distribution channels for basic equipment measures.	– Build network of non-lighting trade allies. – Assess upstream buy-down options.
New construction market is relatively untapped, but projects are challenging and potential is low due to new building codes and weak economic/market conditions.	– Continue funding for NEEA promotion of aggressive codes. – Implement opportunities to clarify and streamline current new construction process. – Monitor market activities and assess savings potential in out-years. – Assess costs/benefits of developing a new construction module in the custom deemed calculator tool set to simplify process.

2.7.6. Marketing Strategies and Tactics

A new strategic planning effort for marketing (see Section 3.4.2) is expected to benefit all sectors, particularly in the areas of increased communication with customers and outreach to trade allies, new targeted marketing materials for End-users, and training for marketing staff. In addition, the commercial sector will work with the marketing team to implement the following initiatives to support its strategy.

- Explore ways to create linkages between opportunities and encourage utilities to market and/or recommend follow-on efficiency actions that leverage other BPA reimbursements.
- Simplify and upgrade the lighting calculator to include a sales tool that helps utilities sell projects to end-users.
- Develop sell sheets that help energy efficiency representatives (EERs) explain how Utility Customers can bundle BPA programs and measures to create a customized suite of services for their End-use consumers.
- Complement deemed measures with “packaged” marketing materials (e.g., a commercial kitchen or schools package).
- Develop online tools, such as an audit tool, that trade allies or Utility Customers can use to support End-users.

2.8. Industrial Sector Strategy

The BPA industrial sector initiative is designed to streamline program participation, coordination and delivery, and to provide more one-on-one Customer Utility and industrial end-user support. This effort, known as the Energy Smart Industrial (ESI) Program, was launched on October 1, 2009. The ESI program consists of five components; some are entirely new, while others are simply more efficient iterations of older offerings.

2.8.1. Accomplishments

Table 21 below presents the energy efficiency savings goal for the industrial sector and the progress toward meeting it. As shown, the goal is 67 aMW; the savings achieved in 2010 and 2011 are 44 aMW; and the projected 2012-2014 savings estimate is 23 aMW. The program goal excludes industrial sector savings from non-programmatic activities and from NEEA's market transformation efforts.

Table 21. Industrial Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	67
Achieved 2010/2011 Savings	44
Projected 2012-2014 Savings	23

2.8.2. Savings Estimates, Budgets and Performance Metrics

Table 22 provides estimates of annual energy savings expected from key industrial sector opportunities, including existing activities and planned new ones. To adjust for the over-achievement in 2011, the table below shows reduced savings estimates in 2012-2014, which aligns with the overall program target and capital budget. It is likely, however, that the Industrial program will achieve up to 12 aMW of savings in 2012, as the program continues adjust to program changes and projects currently in the pipeline are completed.

Table 22. Sector Savings by Opportunity (aMW)

Opportunity	aMW					
	2010 Actual	**2011** Estimated	**2012** Projected	**2013** Projected	**2014** Projected	**2010-2014 Total**
Lighting	3.2	4.0	1.3	1.3	1.5	**11.2**
Heating and Cooling	-	2.1	0.3	0.3	0.3	**2.9**
Refrigeration	0.4	2.3	0.5	0.5	0.5	**4.2**
Water Heat	-	-	-	-	-	**-**
Motors/Drives	1.3	5.5	1.3	1.4	1.7	**11.2**
Improvements	3.6	9.5	2.1	2.2	2.6	**19.9**
Compressed Air	0.8	4.5	1.1	1.1	1.3	**8.7**
Energy Management	-	1.3	0.5	0.6	0.6	**3.0**
Other Industrial	5.2	-	-	-	-	**5.2**
Total	**14**	**30**	**7**	**7**	**8**	**67**

Table 23 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW) and the levelized cost over the lifetime of the savings (levelized $/MWh) for the total five-year time period.

Table 23. Sector Costs by Opportunity (aMW)

Opportunity	$Millions							Average $/kWh	Average $M/aMW	Average Levelized Cost ($/kWh)
	2010	2011	2012	2013	2014	Total		2010-2014	2010-2014	2010-2014
Lighting	$7.5	$6.6	$2.9	$3.0	$3.5	**$14.0**		**$0.27**	**$2.32**	**$0.03**
Heating and Cooling	$0.0	$1.1	$0.6	$0.5	$0.6	**$2.8**		**$0.23**	**$1.98**	**$0.03**
Refrigeration	$1.0	$2.6	$1.3	$1.2	$1.4	**$7.4**		**$0.29**	**$2.50**	**$0.03**
Water Heat	$0.0	$0.0	$0.0	$0.0	$0.0	**NA**		**NA**	**NA**	**NA**
Motors/Drives	$2.8	$8.0	$3.4	$3.6	$4.2	**$9.8**		**$0.28**	**$2.44**	**$0.03**
Efficiency	$6.7	$10.0	$4.2	$4.6	$5.3	**$9.7**		**$0.23**	**$1.98**	**$0.03**
Compressed Air	$1.6	$5.3	$2.2	$2.4	$2.8	**$13.5**		**$0.25**	**$2.15**	**$0.03**
Energy Management	$0.0	$1.4	$0.6	$0.6	$0.7	**$3.2**		**$0.13**	**$1.10**	**$0.01**
Other Industrial	$10.7	$0.0	$0.0	$0.0	$0.0	**$3.2**		**$0.13**	**$1.10**	**$0.01**
Total	**$30.4**	**$35.1**	**$15.2**	**$15.9**	**$18.4**	**$115.0**		**$0.24**	**$2.12**	**$0.03**

2.8.3. Adjustments since the 2010 Action Plan

The updated industrial sector savings and costs reflect changes due to several factors. The most significant adjustments are the result of the following:

- During the post-2011 process, utilities requested that they be able to receive a flexible reimbursement rate from BPA for industrial projects to better manage EEI budgets. The industrial sector now allows utilities to request reimbursement ranging between $0.15 - $0.25/kWh, with a 70 percent cost cap.

- Due to capital budget reductions, funds for the ESI program partner overhead have been reduced. As a result, total achieved savings from this program are expected to decline from 2010 and 2011 acquisitions.

2.8.4. Achieving the Savings

OVERVIEW OF EXISTING ACTIVITIES

The ESI program has been operating since October 2009, and has 103 utility participants. It has successfully achieved an increase in savings in the industrial sector. The ESI program approach calls for more one-on-one contact with End-users and direct support from designated BPA representatives. A cornerstone of BPA's industrial program, ESI provides a single point-of-contact to streamline participation, coordination and delivery for those utilities that opt-in. The ESI program has five components, explained below, all of which are managed by BPA's third-party program delivery partner/contractor, Cascade Engineering.

ESI: Our ESI partner/contractor, Cascade Engineering, serves as the primary point-of-contact for BPA Utility Customers. Each BPA Customer Utility is assigned a specific ESI

"partner," whose core responsibilities is to provide clear, concise explanations of program components and support their delivery. This support may include serving as a technical resource, developing actionable plans for End-users, identifying custom project opportunities, conducting review and analysis of custom projects, and submitting projects for utility approval.

Energy Management Pilot: The Energy Management Pilot targets the valuable, but elusive, operations and maintenance (O&M) savings opportunities that come from diligent tracking of both building and equipment performance. There are three complementary approaches within this pilot: *the Energy Project Manager*, *Track and Tune Projects* and *High Performance Energy Management*.

- The *Energy Project Manager* supplements End-user resources with additional staff or contractors, whose primary focus is identifying and executing energy efficiency projects.
- *Track and Tune Projects* are focused primarily on system tune-ups and O&M opportunities.
- *High Performance Energy Management* encourages and trains individuals at industrial End-users to become energy champions, whose role is to educate and instill the principles of continuous energy improvement (CEI). BPA has incorporated five years of NEEA work in CEI into the ESI program.

Trade Ally Delivered Small Industrial Measures: The Small Industrial Measures component targets projects and opportunities with simpler technologies and less energy savings potential. The customers' ESI partner is a valuable resource in the implementation of this opportunity. This component provides analysis tools to trade allies to facilitate project specification and development. Allies are currently using a small compressed-air calculator. It was developed in conjunction with the Energy Trust of Oregon (ETO) and several utilities to create consistency for vendors. The small compressed-air calculator includes the following measures: variable frequency drive (VFD) air compressors load/unload air compressors, zero loss drains, cycling refrigeration dryers, increased air storage and efficient filters. Other planned tools include refrigeration and industrial VFDs, both of which have multiple measures that may warrant a simplified calculator.

Northwest Trade Ally Network (Non-Residential Lighting): The Northwest Trade Ally Network is focused on increasing participation in industrial lighting projects. This component is led by industrial lighting specialists working one-on-one with trade allies, customers and End-users. Lighting specialists support program delivery by conducting site visits, reviewing proposals and providing recommendations to end-users.

BPA-funded Technical Service Provider (TSP): Through the ESI Program partner/ contractor, BPA will fund TSP consultants to provide custom-project assistance with scoping, project assessments, M&V plans, completion reports and other tasks.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH

Target Segment Strategies: BPA's ESI program delivery partner/contractor has developed a strategy for addressing energy savings potential in wastewater facilities. A specialized ESI Program, which incorporates technical and practical knowledge of the

wastewater industry, has been developed. BPA has deferred work on a strategy for IT and data centers.

Emerging Technologies Research: There are currently no identified areas of opportunity for E3T in the immediate future. This group will continue to scope areas of opportunity to include industrial measures into the emerging technology portfolio.

2.8.5. Overview of Market Barriers and Challenges

Table 24 outlines unique barriers to implementing energy efficiency projects in the industrial sector and strategies for overcoming them.

Table 24. Industrial Market Barriers and Mitigation Strategies

Barriers	Possible Mitigation Strategies
Access to or competition for capital	– Assess financing options in the form of interest-rate buy-downs or provide financing through the End-user's bill. – Partner with lending firms to illustrate the tangible value of energy efficiency investments.
Lack of in-house expertise or time at End-user facilities.	– Focus on supplementing and training in-house resources. – Give guidance and support using implementation staff. – Provide training to existing End-user personnel. – Fund the salaries of new staff or contractors to take on the role of in-house experts.
Real or perceived programmatic hurdles surrounding processes and paperwork.	– Provide program forms in electronic formats. – Designate key personnel to act as liaisons between End-users and program staff.
Concerns over proprietary company data.	– Designate key personnel to act as liaisons between End-users and program staff. – Build trust and confidence between designated liaison and End-user.
Program Savings Adjustments from 2011 to 2012-2014	– Encourage and support self funding efforts of utilities. – Reduce ESIP FTE funding levels – Provide utilities with variable incentive rate to leverage more out of budget – Removed Program Partner's aMW performance incentive – Support Energy Management which allows for utility management of budgets for years 2-5. – Reduced TSP budget by 50% which impacts large project.
Available funding through reduced Energy Efficiency Incentive budgets	– BPA has created the Large Project Fund, which allows Customer Utilities to access additional funds for any projects where the total reimbursement is at least 50% of their total rate period EEI.
Credibility of the project and its forecasted results.	– Disseminate positive press, End-user testimonials and case studies touting the successes of past participants to build credibility for the program and process. – Provide reassurance and feedback about project dollar

	savings using implementation staff. BPA currently offers progress payments for projects generating greater that 2 million kWh/yr or estimated reimbursement of greater than $700K.

2.8.6. Marketing Strategies and Tactics

The industrial sector has created a targeted marketing strategy to address its customer base and program offering. The strategy has four primary audiences: Utility Customers, industrial End-users, trade allies and regional stakeholders.

The key components of BPA's ESI program marketing approach include:

- Continuing to have effective communication with Utility Customers. Focus on the challenges, barriers and internal pressures of each utility. Including, working with utilities to bring best value for their budget dollars. In addition, ESI partner's will work with utilities on industrial account planning to set the course for next two years.

- Continuing to focus on Energy Management opportunities which are low-cost/no-cost.

- Developing awareness and earning the trust of End-users. Will be more reactive than proactive. Provide minimal direct outreach through one-on-one or group meetings, newsletters, case studies and e-mails. Minimum participation in trade shows and seminars that target the key industries the ESI program seeks to reach.

- Bringing awareness of value of ESI to region by leveraging regional stakeholders' influence with Customer Utilities and End-users to help drive participation. Nurture BPA's close relationship with regional stakeholders, such as NEEA, ETO, utilities, Northwest Food Processors Association, Pulp and Paper Institute, and Oregon Association of Clean Water Agencies. Further develop the cooperation and coordination that have made these entities such successful partners in the past. These relationships allow for potential cost sharing opportunities.

2.9. Agricultural Sector Strategy

The agricultural sector consists of End-users generally located in rural areas spread throughout BPA's territory. This sector is focusing on the continuing success of Scientific Irrigation Scheduling (SIS) and other measures, such as VFDs and irrigation hardware. In addition, the sector has developed collaborative agreements with regional Resource Conservation and Development Councils (RC&Ds). BPA's agricultural sector will assist Customer Utilities to implement opportunities through enhanced marketing and outreach strategies and regional coordination.

2.9.1. Accomplishments

Table 25 below presents the conservation savings goal for the agricultural sector and the progress toward meeting it. As shown, the goal is 32 aMW; the savings achieved in 2010 and 2011 are 17 aMW; and the projected 2012-2014 savings estimate is 15 aMW. The program goal excludes agricultural sector savings from non-programmatic activities and from NEEA's market transformation efforts.

Table 25. Agricultural Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	32
Achieved 2010/2011 Savings	17
Projected 2012-2014 Savings	15

2.9.2. Savings Estimates, Budgets and Performance Metrics

Table 26 provides estimates of annual energy savings expected from key agricultural sector opportunities, including existing activities and planned new ones. SIS savings are reported as annual savings here; only savings achieved in 2014 will be counted toward the 6th Power Plan target.

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Table 26. Sector Savings by Opportunity (aMW)

Opportunity	**aMW**					
	2010 Actual	**2011** Estimated	**2012** Projected	**2013** Projected	**2014** Projected	**2010-2014 Total**
Lighting	0.11	1.50	-	-	-	**1.61**
Refrigeration	0.03	0.01	-	-	-	**0.04**
Motors/Drives	2.74	2.40	1.25	0.75	1.25	**8.39**
Efficiency Improvements	0.00	0.00	-	-	-	**0.00**
Irrigation	0.57	0.37	0.61	0.50	0.75	**2.80**
SIS	3.91	3.80	3.00	3.00	3.00	**16.71**
De-energization	0.39	-	0.25	0.25	0.25	**1.14**
Other Ag	0.46	0.62	-	-	-	**1.07**
Total	**8.2**	**8.7**	**5.1**	**4.5**	**5.3**	**31.8**

Table 27 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW) and the levelized cost over the lifetime of the savings (levelized $/MWh) for the total five-year time period.

Table 27. Sector Costs by Opportunity (aMW)

Opportunity	$Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/kWh)
	2010	2011	2012	2013	2014	2010-2014	2010-2014	2010-2014	2010-2014
Lighting	$ 0.34	$ 0.28	$ -	$ -	$ -	**$ 0.62**	**$ 0.34**	**$ 2.95**	**$ 0.06**
Refrigeration	$ 0.04	$ 0.02	$ -	$ -	$ -	**$ 0.06**	**$ 0.17**	**$ 1.52**	**$ 0.02**
Motors/Drives	$ 4.41	$ 3.95	$ 2.07	$ 1.19	$ 2.07	**$ 13.69**	**$ 0.19**	**$ 1.64**	**$ 0.03**
Irrigation	$ 0.96	$ 0.61	$ 1.02	$ 0.82	$ 1.07	**$ 4.47**	**$ 0.18**	**$ 1.60**	**$ 0.07**
SIS	$ 3.70	$ 3.60	$ 1.77	$ 1.77	$ 1.77	**$ 12.62**	**$ 0.38**	**$ 3.32**	**$ 0.33**
De-energization	$ 0.29	$ -	$ 0.15	$ 0.15	$ 0.15	**$ 0.74**	**$ 0.07**	**$ 0.65**	**$ 0.08**
Other Ag	$ 0.61	$ 0.83	$ -	$ -	$ -	**$ 1.44**	**$ 0.15**	**$ 1.34**	**$ 0.02**
Total	**$ 10.36**	**$ 9.31**	**$ 5.01**	**$ 3.93**	**$ 5.06**	**$ 33.66**	**$ 0.17**	**$ 1.45**	**$ 0.06**

2.9.3. Adjustments since the 2010 Action Plan

The updated agricultural sector savings and costs reflect changes due to several factors. The most significant adjustments are the result of the following:

- SIS savings are considered to have a one-year measure life. The measures will receive annual incentives and savings towards program goals will be reported annually. Only those SIS achievements in 2014 will be counted toward the total five-year period and the 6th Power Plan targets.
- Transformer De-energization will be considered to have a one-year measure life beginning in April 2012.
- Pump testing audits have been added.

2.9.4. Achieving the Savings

OVERVIEW OF EXISTING ACTIVITIES

Current agricultural sector opportunities and planned changes are outlined below.

Irrigation Hardware and Systems: BPA will continue to offer deemed savings reimbursements for irrigation system upgrades, including irrigation piping, sprinklers, regulators and nozzles, as well as the Green Motors Rewind measure. Recently, VFDs for spud/onion sheds were reclassified as industrial.

Scientific Irrigation Scheduling: SIS continues to be a successful offering. Based on evaluation findings, the SIS offering was changed to simplify contract requirements for utilities and incorporate a one-year measure-life assumption.

Premium Efficiency Motors (PEM): The focus of the PEM Ag motors measure is on older rewound motors that are in use and may fail.

Pump Testing: Pump testing is a screening and evaluation approach to determine pumping efficiency. If an upgrade/replacement project is implemented, BPA will credit the utility for a portion of the testing cost. If no project results from the testing, the utility will cover the entire cost of the test.

RC&D Partnerships: BPA is working with state resource conservation and development councils to help utilities reach agricultural producers in their service areas. BPA signed three state-level agreements including the Oregon Association of RC&D Councils, the Washington Association of RC&D Councils, and a joint agreement for Idaho, Montana and Wyoming RC&D councils to help utilities reach energy savings goals within the agricultural industry. RC&D councils have existing relationships with agricultural producers in BPA's customer utility service territories and can provide efficiency energy program information to them. The RC&D Partnerships program is designed to provide regional consistency for BPA Utility Customers and End-users by delivering cost-effective energy savings in the agricultural sector.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH

Planned activities in the agricultural sector will focus on adding new deemed measures and new marketing approaches that reach more agricultural end-use customers and extract savings from hard-to-reach market segments.

Irrigation Districts: BPA serves several Utility Customers that are irrigation districts, and as such BPA is able to work directly with them to develop projects. While irrigation district projects offer significant savings opportunities, there are significant barriers. The projects are large and require a long-term funding commitment and they do not fit well within BPA's existing participation constraints. Nevertheless, BPA has begun to implement a few projects to improve efficiency within irrigation districts. The agricultural sector will evaluate barriers and opportunities associated with irrigation districts to more fully understand ways to capture potential untapped savings.

Variable Frequency Drives (VFDs) for Hardware. BPA has offered VFDs in agriculture as a BPA Qualified program in an effort to gather data to present to the RTF for a deemed measure. BPA staff is conducting analyses of the field data and plans to develop a proposal for presentation to the RTF.

Irrigation Hardware. The RTF recently voted to place irrigation hardware measures as out-of-compliance with the new guidelines. BPA staff will work with the RTF to move these hardware measures to the small saver category.

LEPA: The BPA Low Energy Precision Applications (LEPA) demonstration proposes to accelerate the market for agricultural energy efficiency savings opportunities in the Northwest, as identified in the 6th Power Plan. The effort would target producers of food (for humans and animals) that use irrigated water management or irrigation. Producers can be landowners, operators or lessees of the land and equipment. The purpose of the demonstration project will be to assess the viability of LEPA in the Northwest. Topography, crop, soil type and management practices are all factors that must be considered when the technology is deployed.

Turf Pilot. BPA is currently conducting an energy efficient turf landscape irrigation pilot. The pilot follows the peak irrigation season, May to September, and includes applications for residential and commercial landscaping, golf courses, and government and municipal properties. The pilot allows BPA to gather data to support an evaluation of water conservation savings potential and cost-effectiveness to submit for RTF approval.

Emerging Technologies Research. There are currently no identified areas of opportunity for E3T in the immediate future. This group will continue to scope areas of opportunity to include agricultural measures into the emerging technology portfolio.

2.9.5. Overview of Market Barriers and Challenges

Table 28 outlines the barriers to implementing energy efficiency measures in the agricultural sector and strategies for overcoming them.

Table 28. Agriculture Sector Barriers and Mitigation Strategies

Barriers	Possible Mitigation Strategies
Energy efficient equipment has a higher first cost.	– Offer rebates to help offset the purchase cost of equipment. – Explore financing options and loan guarantees for higher-cost projects such as irrigation district pumping. – Direct RC&Ds to help farmers identify and secure farm bill grants and other assistance. – Assess increasing the funding cap for certain agriculture sector projects.
Major equipment upgrades are large, expensive and financially out of reach for farmers.	
BPA's schedule is out of sync with seasonal farming schedules.	– Evaluate ways to adjust implementation schedules to more closely match the seasonal nature of irrigation farming.
In rural areas, with agricultural based loads, utilities are mostly small and have limited capacity to operate and market programs.	– Work with RC&Ds to market opportunities directly to End-users and provide the needed technical assistance. – Conduct outreach and distribute materials to vendors, distributors and agricultural sector trade associations.
Custom project process is too complex.	– Move to more deemed measures for the agricultural sector. – Streamline M&V requirements on custom projects.

2.9.6. Marketing Strategies and Tactics

The agricultural sector will incorporate new marketing strategies to overcome barriers and stimulate participation by End-users. The key components of this effort include:

- Creating comprehensive marketing materials and conducting vendor training focused on targeted segments, such as crop farms, nurseries, wineries and dairies. Materials will be distributed to trade allies, vendors, utilities, and farm industry trade associations and stakeholders.
- Leveraging farmers' relationships with RC&Ds, vendors and trade associations to direct initiative information to end-users.
- Developing marketing materials targeted to specific agricultural sector end-use segments, including dairies, wineries, greenhouses and others.
- Conduct outreach to ensure vendors are familiar with BPA's energy efficiency opportunities.

2.10. Federal Sector Strategy

The federal sector represents approximately 3 percent of BPA's total power sales. BPA has direct access to many federal sector End-users,[18] which offers a marketing and delivery advantage over other customer segments. In addition, federal agencies operate under multiple executive orders and laws with aggressive energy efficiency goals.

The Energy Smart Federal Partnership (ESFP) encourages and assists regional federal agencies served by BPA to identify, fund and implement energy efficiency projects. ESFP provides full-service project assistance directly to federal agency End-users. This program model has been successfully delivering a steady flow of energy savings over the past 10 years. Due to changes to the overall energy efficiency program offerings in 2012, the Federal Sector program has been refocused on two subsectors: direct served federal agencies (DSF) and utility served federal agencies (USF). A third subsector, reserve powered federal (RPF), has a pre-approved program, Energy Smart Reserve Power, which is now planned for 2013 and 2014. The 2013 update of the EE Action Plan will incorporate the addition of savings and costs from this initiative.

2.10.1. Accomplishments

Table 29 below presents the conservation savings goal for the federal sector and the progress toward meeting it. As shown, the goal is 15 aMW; the savings achieved in 2010 and 2011 are 6 aMW; and the projected 2012-2014 savings estimate is 9 aMW.

Table 29. Federal Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	15
Achieved 2010/2011 Savings	6
Projected 2012-2014 Savings	9

2.10.2. Savings Estimates, Budgets and Performance Metrics

Table 30 provides estimates of annual energy savings expected from key federal sector opportunities, including existing activities and planned new ones.

[18] USF end-user services provided with consent from and in coordination with the serving customer utility.

Table 30. Sector Savings by Opportunity (aMW)

Opportunity	aMW					
	2010 Actual	**2011** Estimated	**2012** Projected	**2013** Projected	**2014** Projected	**2010-2014 Total**
Utility Serve Federal (USF)	0.46	0.90	1.25	1.25	1.25	**5.1**
Direct Serve Federal (DSF)	0.52	1.00	1.75	1.75	1.75	**6.8**
Reserve Power Federal (ESRP)	1.90	1.20	-	-	-	**3.1**
Total	**2.9**	**3.1**	**3.0**	**3.0**	**3.0**	**15.0**

Table 31 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW) and the levelized cost over the lifetime of the savings (levelized $/kWh) for the total five-year time period.

Table 31. Total Sector Costs by Opportunity ($M) and Cost Metrics

Opportunity	$Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/MWh)
	2010	**2011**	**2012**	**2013**	**2014**	**Total**	**2010-2014**	**2010-2014**	**2010-2014**
Utility Serve Federal (USF)	1.00	1.96	2.72	2.72	2.72	**11.10**	**$ 0.25**	**$ 2.17**	**$ 28.01**
Direct Serve Federal (DSF)	1.00	3.66	3.37	3.37	3.37	**14.78**	**$ 0.22**	**$ 1.93**	**$ 24.85**
Reserve Power Federal (ESRP)	2.83	1.79	-	-	-	**4.62**	**$ 0.17**	**$ 1.49**	**$ 19.20**
Total	**4.82**	**7.40**	**6.09**	**6.09**	**6.09**	**30.49**	**$ 0.22**	**$ 1.92**	**$ 24.82**

2.10.3. Adjustments since the 2010 Action Plan

The updated federal sector savings and costs reflect changes due to several factors. The most significant adjustments are the result of the following:

- For consistency across sectors, the federal sector measures will be offered in the same way as custom projects in other sectors, and reimbursements will be made according to BPA's standard policy. These changes have lowered the overall cost of the federal sector program.
- The ESRP pilot program, on hold for 2012 as a cost-saving exercise, will be offered during 2013 and 2014 instead of 2012 and 2013.

2.10.4. Achieving the Savings

OVERVIEW OF EXISTING ACTIVITIES

ESFP is the delivery strategy for the federal sector. It was successful in the past and has been redesigned to help increase savings. ESFP will emphasize relationship management with key federal agencies, assistance with their strategic energy management plans and access to third-party financing, as opposed to managing the implementation of specific projects. ESFP is currently completing multimillion-dollar projects through initiatives with Puget Sound Naval Bases and Joint Base Lewis McChord.

Moving into the 2012-2014 period, ESFP will provide services targeting key federal subsectors.

Utility Served Federal (USF): The USF subsector is comprised of all federal agency facilities served by a Customer Utility. This subsector will be impacted significantly by post-2011 changes to BPA's energy efficiency programs. As a result, ESFP will focus on informing agencies of the changes, coordinating with EERs and communicating with Customer Utilities. BPA will continue to offer ESFP services with a focus on testing alternative project implementation methods using the Corps of Engineers, GSA or private turn-key implementation contractors. The federal sector's role with USF will be more limited than in the past. Incentives for cost-effective conservation will be provided by the serving utility. The federal sector will continue to provide energy assessment and project development services, but will provide implementation support only for large scale, third-party financed projects.

Direct Served Federal (DSF): The DSF subsector is comprised of a limited number of federal sites that receive power directly from BPA. DSF sites will be allocated an Energy Efficiency Incentive (EEI) budget like other BPA customer utilities. BPA's DSF customers include three Navy bases near Puget Sound, DOE Richland and Fairchild Air Force Base. The DSFs have no other serving utility and BPA's Federal Sector will continue to take a hands-on role with energy efficiency. BPA will offer an array of services, including site energy assessments, Utility Energy Service Contract (UESC) facilitated energy project financings, EEI budget management advice, energy project data input into EE Central, and energy project implementation, where specified by a sub-agreement (task order/delivery order) under a UESC or Interagency Agreement (IA).

This subsector received EEI allocations effective October 1, 2011. Energy Conservation Agreements (ECA) covering the EEI allocations are being put in place for each DSF. An energy efficiency representative has also been assigned to each DSF account. BPA's focus will be on helping with EEI funds management, EE Central reporting and related activities. ESFP will continue to offer services while looking for opportunities to test alternative project implementation methods using the Corps of Engineers, GSA or private turn-key implementation contractors.

Reserve Power Federal (RPF): The RPF subsector is comprised of all federal power loads with no serving utility. RPF loads include 28 irrigation districts, Corps of Engineers and Bureau of Reclamation hydroelectric facilities, and BPA's own station service

substations. The RPFs loads are served with Reserved Power[19] and have no other serving utility, and the Federal Sector has plans to take a hands-on role with energy efficiency assistance through a new program, Energy Smart Reserve Power (ESRP). ESRP was designed to offer limited funds available by competitive solicitation, but due to capital budget limitations, the ESRP program was put on hold for 2012. This subsector represents load with significant efficiency opportunities. The acquisition costs in this subsector have been low and the savings have been substantial (roughly 40 percent of the federal sector totals). BPA will continue to look for opportunities to fund RPF initiatives, which are a key future activity to obtain savings from the federal sector.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH

The federal sector is exploring opportunities to implement projects in a way that is less labor intensive for BPA. Eliminating the barriers presented by lack of staff will help to significantly increase the energy efficiency savings achieved during the Action Plan period.

ESFP evaluates the same universe of deemed measures and custom project opportunities offered in other sectors. Improvements to BPA's existing initiatives and new measures and opportunities in other sectors will be available for federal facility projects, where appropriate.

The ESFP is currently discussing additional federal energy-saving opportunities with a number of agencies including:

- DOE Office of Science/PNNL (DSF)
- DOE Idaho Operations Office and Idaho National Laboratory (USF)
- Department of Veterans Affairs (USF)
- U.S. Forest Service (USF)
- Army Corps of Engineers (RPF)
- Coast Guard (USF)
- U.S. Fish and Wildlife Service (USF, RPF)

Emerging Technologies Research: No technologies unique to ESFP are currently on BPA's E3T agenda. Research activities in other sectors (commercial, industrial, agricultural and residential) become available to federal facilities when approved.

Federal sector facilities offer potential pilot testing grounds for many E3T technologies, and BPA will consider appropriate research opportunities. Because federal agencies are encouraged to respond to energy efficiency Executive Orders, research measures may be easier to implement.

[19] Project Reserved Power is power generated at federal projects that has been congressionally reserved for use at United States Bureau of Reclamation projects and related facilities.

2.10.5. Overview of Market Barriers and Challenges

Table 32 outlines barriers to implementing energy efficiency measures in the federal sector and strategies to overcome them.

Table 32. Federal Market Barriers and Mitigation Strategies

Barriers	Possible Mitigation Strategies
The federal market is limited because of the finite number of agencies, facilities and potential energy-saving projects.	– Capitalize on existing relationships. – Strive to achieve deep and comprehensive energy savings at available facilities. – Conduct outreach to new federal facilities.
Many federal agencies in the Pacific Northwest have already implemented the most cost-effective energy efficiency projects, so little low-hanging fruit remains.	– Strive to achieve deep and comprehensive energy savings at available facilities. – Continue to evaluate and incorporate new technologies as they become available.
BPA lacks available engineering and supply-chain staffing resources.	– Continue testing and transitioning to a less staff-intensive program delivery approach.
Federal agencies lack money to achieve their energy efficiency goals. When they get appropriated funds, they need to be obligated within the fiscal year.	- Continue to facilitate third-party financings to raise the capital needed to implement agency projects. - Continue to hold agency earned incentives as a way to leverage additional electric-saving projects.

2.10.6. Marketing Strategies and Tactics

BPA currently responds to federal project opportunities on a case-by-case basis since ESFP conducts very little marketing and promotion. Adding an account management structure would allow BPA to be more proactive in providing efficiency services to the federal sector. Expanded marketing capacity to support this sector could also help.

The federal sector is considering the following outreach and coordination strategies:

- Establish agency representatives for each federal agency to establish more aggressive BPA outreach and communication.
- Create a protocol for communicating federal agency energy plans with BPA's utility customers.
- Hold periodic workshops for federal facility energy managers.

The federal sector is considering the following marketing strategies and outreach tactics:

- Create a federal sector component to BPA's energy efficiency Website.
- Create more ESFP fact sheets or other program summary materials.
- Establish regional recognition for high achievers.

Prior to implementing a robust marketing strategy, the federal sector must ensure that ESFP has the capacity to manage and deliver projects in a timely manner. With future

funding issues currently being resolved for the RPF sub-sector, marketing services to that sub- subsector can begin.

2.11. Distribution System Efficiency Sector Strategy

Electric utilities are under pressure to improve reliability and system performance while dealing with the ongoing challenges of an aging infrastructure. To support these customers and capture distribution efficiency savings, BPA recently developed the Energy Smart Utility Efficiency (ESUE) program, available to utilities in 2012. Through ESUE, BPA offers several distribution system efficiency measures, including high-efficiency transformer replacement, load balancing, line reconductoring and voltage optimization.

Voltage optimization (VO) has proven to be cost-effective at reducing end-use energy consumption, reducing distribution system losses, providing higher system reliability and improving power quality. Although utilities have been experimenting with conservation voltage reduction (CVR) for more than 30 years, it has not been widely adopted due to perceived high costs and negative customer impacts, as well as complex design, operations and implementation. In addition, the M&V processes for quantifying benefits are complex and not widely understood. In 2010, the RTF approved M&V protocols for residential voltage optimization based on the findings of the 2007 NEEA Distribution Efficiency Initiative (DEI) Study. BPA staff is currently working to increase awareness of the benefits to utilities and spur interest in voltage optimization as a viable energy efficiency measure.

2.11.1. Accomplishments

Table 33 below presents the conservation savings goal for the DSE sector and the progress toward meeting it. As shown, the goal is 5 aMW; the savings achieved in 2010 and 2011 is 1 aMW; and the projected 2012-2014 savings estimate is 4 aMW.

Table 33. DSEI Program Goal, Achieved Savings and Projected Savings (aMW)

Program Goal	5
Achieved 2010/2011 Savings	1
Projected 2012-2014 Savings	4

2.11.2. Savings Estimates, Budgets and Performance Metrics

Table 34 provides estimates of annual energy savings expected from key distribution system efficiency sector opportunities, including existing activities and planned new opportunities.

Table 34. Sector Savings by Opportunity (aMW)

Opportunity	aMW					
	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total
System Improvements	0.47	0.50	0.50	0.50	0.50	**2.5**
Voltage Optimization	-	-	0.50	1.00	1.25	**2.8**
Total	**0.5**	**0.5**	**1.0**	**1.5**	**1.8**	**5.2**

Table 35 displays total programmatic costs (reimbursement, third-party costs and utility performance payments) annually and for the 2010-2014 period. The table also displays three average cost metrics: dollars per first-year kWh ($/kWh), millions of dollars per average megawatt ($M/aMW) and the levelized cost over the lifetime of the savings (levelized $/kWh) for the total five-year time period.

Table 35. Sector Costs by Opportunity (aMW)

Opportunity	$Millions						Average $/kWh	Average $M/aMW	Average Levelized Cost ($/kWh)
	2010	2011	2012	2013	2014	Total	2010-2014	2010-2014	2010-2014
System Improvements	0.65	0.70	0.70	0.70	0.70	**3.46**	**$ 0.16**	**$ 1.40**	**$ 0.01**
Voltage Optimization	-	-	1.31	2.63	3.29	**7.23**	**$ 0.30**	**$ 2.63**	**$ 0.02**
Total	**0.65**	**0.70**	**2.01**	**3.33**	**3.99**	**10.68**	**$ 0.24**	**$ 2.12**	**$ 0.02**

2.11.3. Adjustments since the 2010 Action Plan

The updated Distribution System Efficiency sector savings and costs reflect changes due to several factors. The most significant adjustments are the result of the following:

- Savings projections have been substantially reduced due to slower-than-expected program ramp-up. BPA is currently in the process of contracting with an outside third-party to facilitate the implementation of this program throughout the region.

2.11.4. Achieving the Savings

Overview of Existing Activities

Simplified Voltage Optimization (VO) M&V Protocols. BPA has developed a set of simplified VO M&V protocols to ease the process of capturing energy savings from VO.

In 2010, the RTF approved M&V protocols for residential VO based on the findings of the 2007 NEEA Distribution Efficiency Initiative (DEI) Study. The simplified protocols will allow BPA to calculate energy savings for various methods of implementing VO, with minimal metering, including line-drop compensation, voltage fixed reduction, and automated voltage feedback control. All data collection protocols and templates were standardized to minimize error, increase efficiency and reduce administrative burden.

Education and Training Workshops. In 2009, BPA held general ESUE workshops to clarify voltage optimization design principles, effective approaches and effects on equipment, among others. These workshops targeted both energy efficiency and distribution engineering staff. In 2011, BPA held ESUE training targeted at distribution engineers to train them to do the initial assessment of feeders for a voltage optimization measure.

BPA intends to work with the Northwest Public Power Association (NWPPA) to facilitate ESUE training. Future training will focus on system modeling and mapping required for accurate voltage optimization analysis. Due to the small number of distribution engineers in each utility, it is not cost-effective to hold multiple training sessions throughout the region. BPA is exploring using Web-based technology to conduct training with a cohort of utility distribution engineers.

Distribution System Studies and Program Partner. In 2010 and 2011, BPA contracted technical services to assess the distribution system energy efficiency potential at 15 utilities. The initial scoping assessments take three to nine months to complete, depending on the completeness of a utility's distribution-system model. As of July 2011, one utility completed the detailed assessment and is ready to submit a custom project proposal. BPA's strategy is to "cherry pick" and work closely with the five utilities most likely to implement distribution system energy efficiency projects to gain momentum and market adoption.

In June 2011, BPA selected a third-party contractor to implement program delivery that will be responsible for developing a comprehensive marketing plan, meeting targets, tracking the execution of VO M&V plans, reporting progress, and managing continued distribution efficiency education and training workshops and activities. The contractor will report to BPA on new distribution technologies discovered through working with regional stakeholders and engineering firms, and will incorporate approved technologies into outreach and marketing plans.

System Improvements (non-Voltage Optimization). Utilities have expressed interest in increased support for system improvements (reconductoring and transformer replacement). BPA is improving the existing calculator for reconductoring and transformer replacement M&V. With the use of the calculators, utilities with little distribution engineering staff are able to submit custom project proposals to BPA for system improvement.

PLANNED ACTIVITIES AND LONGER-TERM RESEARCH

Expanded Technical Knowledge. BPA plans to increase the number of distribution efficiency technical service providers (TSPs). Through workshops and personal

outreach, BPA is working to increase the energy efficiency awareness of consulting firms that provide distribution engineering services to small utilities.

In addition to the activities outlined above, BPA will pursue opportunities to generate savings and improve the program throughout the five-year Action Plan period. Developing M&V protocols for commercial loads will increase the energy efficiency potential on feeders serving commercial load. The residential load protocols can be applied to commercial loads, but they underestimate the savings by approximately 25 percent.

Emerging Technologies Research. There are currently no identified areas of opportunity for E3T in the immediate future. This group will continue to scope areas of opportunity to include distribution efficiency measures into the emerging technology portfolio.

3. RESEARCH ACTIVITIES

3.1. Overview

It is critical that BPA continuously "fill the pipeline" with innovative energy efficiency strategies and new technologies that will provide ongoing energy savings. BPA's E3T team, a subset of BPA's Energy Efficiency engineering department, leads this effort and plays an important role in identifying and analyzing new energy efficiency technologies for the region. Appendix B provides details about the cost-effective energy savings potential in the Council's 6th Power Plan for each energy efficiency sector, and new technologies are key to meeting this potential.

Innovative ideas and technologies come from multiple sources within and outside BPA. At this time, hundreds of technologies are under consideration and in various stages of research and testing. Constraints on funding and resources require that E3T come up with ways to be efficient and focus its efforts on technologies that hold the most promise for energy savings.

3.2. Emerging Technology Research

The E3T team assesses potential new technologies to determine their viability for energy savings. The team conducts demonstrations and pilot testing to prepare measures for review by the RTF or to include them in other BPA energy efficiency opportunities through a non-deemed mechanism.

Currently more than 200 new and emerging technologies are in the E3T pipeline. The 6th Power Plan lists approximately 145 "measure categories," which contain some 1,500 application-specific measures; direct links between the Council's measure categories and technologies in the E3T pipeline are difficult to establish. Research, testing and obtaining approval for new technologies is costly and time consuming, but it is essential to maintaining the flow of energy savings opportunities.

Facing resource and cost constraints, BPA's Technology Innovation Office (TIO) is leading an effort to improve efficiency and quality in the E3T process. As part of this effort, the E3T team developed a framework to scan and screen a large number of energy efficiency technologies for those with the greatest potential to generate cost-effective energy savings and deliver the best value to the region. The framework will allow the team to implement a robust technology assessment and acquisition model that includes a number of stages. A hallmark of this effort is strong project management that ensures projects follow best-in-class protocols.

Table 36 below presents the structure for BPA's emerging technology efforts and shows that the effort is highly leveraged, collaborative in nature and regional in focus.

Table 36. Structure of BPA Emerging Technologies

Position	Role and Responsibilities
BPA Project Management Office: Portfolio Manager Project Managers Pilot Project Manager Technical Specialists	Implement E3T program in alignment with program charter. Overall Emerging Technology project guidance. Regional coordination and collaboration with NEEA. National collaboration and coordination with DOE national labs, DOE, research organizations and academic institutions. Creation and oversight of a project management office. Responsibility for leveraging national work in the region; distillation and dissemination to the region. Management of tools, software and collateral related to the above responsibilities. Finalizing project scopes of work and managing contractors doing the work. Providing linkage from technology work to programs and marketing.
Technical Advisory Groups (TAGs)	Composed of regional and national technology experts (volunteers), TAGs help identify and prioritize emerging technologies that need technical work. TAGs ensure BPA does not duplicate efforts of others around the country.
Washington State University	Identifies and screens promising measures, manages TAGs and a new technology database, provides Website content and develops research agenda work plans.
Consulting Engineers	Manage assigned projects and assessments
NEEA*	Co-leads regional Emerging Technology effort with BPA. Manages the Regional Emerging Technologies Advisory Committee (RETAC). Other roles TBD.
Public Utilities and IOUs	Through E3T and NEEA, utilities may choose to fund, manage and/or host particular emerging technology projects of interest and share results through the regional effort.

*As one outcome of NEET, BPA and NEEA co-lead a joint regional collaboration effort on emerging technologies through RETAC.

In general, E3T's near-term focus is directed toward residential and commercial measures, as these are best suited to a centralized emerging technology approach and large-scale implementation of common measures across many utilities.

E3T's near-term focus is on measures identified in the 6th Power Plan that have considerable potential but require research and testing prior to being reviewed by the RTF prior to BPA approval. Research timing and budgetary estimates for a technology are preliminary since the energy savings potential, program adoptability and diffusion rates may change during the research process. E3T will determine whether a technology is proving out and if not, substitute another with equal or better savings potential so BPA can meet its energy savings target.

Overall, BPA's emerging technologies work goes beyond measures in the 6th Power Plan, and the Power Plan contains measures to which E3T has not yet committed. In practice, BPA's commitment is to obtain only the volume of savings required by the public power portion of the 6th Power Plan. BPA is not bound by measures in the 6th

Power Plan and has the flexibility to substitute other measures to obtain savings. While many of the measures in Table 37 represent real, near-term E3T activity, others are offered as a proxy for measures that may be replaced later with more appropriate technologies.

Table 37. Emerging Technologies Initiatives and Savings (aMW)

Initative	2010 Actual	2011 Estimated	2012 Projected	2013 Projected	2014 Projected	2010-2014 Total
Ductless Heat Pumps	1.4	2.9	3	4	5	16
Heat Pump Water Heater		0	0.1	0.1	0.2	0.4
Variable Capacity Heat Pump	0	0.1	0.3	0.4	0.4	**1**
Heat Pump: Ductless Mini-Split		0.1	0.3	0.3	0.3	**1**
VRF/Heat Pump			Pilot	0.1	0.1	**0.2**
Advanced Rooftop HVAC	0.05	0	0	0.1	0.5	**1**
Advanced RTU HVAC Pilot	0.05			0.1	0.5	**1**
HVAC Controls	0	0	0.1	0.4	0.6	**1.1**
Demand-Controlled Ventilation	Pilot	Pilot	0	0.3	0.4	**0.7**
Web-enabled Programmable Thermostats			0.1	0.1	0.2	**0.4**
Controls Commissioning						
LED Applications	0	0	0.01	0.2	0.6	**0.8**
Other LED		Pilot	0.01	0.1	0.5	**1**
LED Streetlighting		Pilot	Pilot	0.1	0.1	**0**
Adaptive Lighting			0	0	0	**0**
Total	**1.5**	**3.1**	**3.92**	**6.3**	**9.4**	**24**

Given the high stakes and significant resource needs associated with getting new technologies tested and into the marketplace, it is critical that BPA's E3T, planning and program teams work together. A joint effort is needed to ensure that new technologies emerging from the E3T process are capable of delivering the savings to achieve BPA's energy efficiency targets.

Setting E3T priorities is an important process to ensure engineering resources are directed to measures that offer the greatest potential for savings. The E3T team screens potential measures and recommends those that show the greatest promise, particularly those that may not be accounted for in the 6th Power Plan. E3T efforts must link with sector planning and delivery to clarify the potential of measures and reach agreement on research priorities and resource allocation. Going forward, BPA will refine ways to align E3T activities with sector planning and implementation needs.

3.3. Existing Measure Research

Existing measure research focuses on assessing and conducting research on measures that are already in the BPA program. This research tends to be engineering-based, e.g., metering, building simulation or engineering calculations. Research originates from needs identified in programs/planning; BPA Qualified measures; RTF measures under review or out of compliance; and measures identified by engineers in the field with potential for deemed savings or a standard protocol.

In 2012, BPA will conduct research on the following measures: VFDs for agriculture; commercial showerheads; smart strips; commercial windows and insulation; agricultural motors; commercial CFLs; rooftop units for small commercial; engine block heater circulating pumps; school thermostats; irrigation hardware; and transformers.

3.4. Evaluation and Other Research

The EE Planning and Evaluation department manages evaluation and market research across all sectors to support continuous program improvement and robust energy savings estimates. There are four major categories of research covered by this group: Process Evaluation, Impact Evaluation, Market Research and Non-programmatic Savings.

PROGRAM PROCESS EVALUATION

For areas where BPA spends funds on program infrastructure, staff develops a schedule for evaluation to document processes, progress, strengths and areas of improvement. Priority may be given to programs with contracts up for renewal or new program areas. BPA spends infrastructure funds for third-party programs and other major delivery models. Process evaluations will be conducted one year after a new program start date and approximately two to four years subsequently, depending on program needs, program changes and previous evaluation findings.

In 2012, BPA has preliminary plans to conduct a process evaluation for: Energy Smart Industrial Program, Residential Products Program, and Annual Measure/program survey of utilities.

EVALUATION – PROGRAM IMPACT EVALUATION

Impact evaluation should estimate the energy savings for a program overall (average participant) and/or for individual measures, depending on the research needs. Various methods may be used for impact evaluation, including statistical analyses of billing data, or engineering assessments (i.e., metering, calibrated building simulation). Impact evaluation will be focused on currently available measures where savings are least certain and the size of achievements could be greatest. Priority may be given to new/pilot measures/programs or regional/RTF research needs or the age of the most recent information. Currently available measures or programs include: BPA Qualified, provisional, deemed, standard protocols (calculated) and custom projects.

In 2012, BPA has preliminary plans to evaluate: PTCS, Energy Smart Industrial Energy Management Pilot, Energy Smart Grocer refrigeration metering, Custom projects and behavior-based master contract for impact evaluation.

MARKET RESEARCH

Market research includes studies required for input on savings or potential estimates, i.e., baseline, costs and market practices, building characteristics and other market and program needs. In 2012, BPA plans to coordinate with NEEA on several studies, including: a) RBSA base study and oversample, b) RBSA Metering Study, c) CBSA Base study and oversample.

NON-PROGRAMMATIC SAVINGS RESEARCH

Non-programmatic savings research includes analysis to estimate cost-effective savings above the 6th Power Plan baseline. In 2012, BPA plans to continue: a) development of a codes and standards savings estimation method and b) developing savings estimates for low-income weatherization.

3.5. Behavior-based Energy Efficiency (BBEE) programs

In response to a growing interest in behavior-based energy efficiency opportunities, BPA has launched efforts to provide support in this area. Currently, BPA is engaged in conducting research, building awareness and supporting pioneering program work for BBEE programs. Over the next several years, BPA will continue to move these opportunities forward across several sectors (residential, commercial, industrial and agricultural) to build infrastructure support for our Utility Customers.

BBEE programs focus on energy savings resulting from changes in individual or organizational behavior and decision-making. For the most part, BBEE programs use a feedback mechanism to show End-users their energy use compared to another point in time and/or other End-users. BBEE programs can be implemented in most sectors.

BBEE programs are growing in prominence around the country, using a substantial body of knowledge and experience associated with behavior change that is rooted in the social sciences. Utilities and others in the energy industry are now using it as a means to

encourage energy efficiency and savings. Documented energy savings of 2 to 3 percent have been common across residential program participants.

Utilities, nationally and regionally, have been implementing residential BBEE programs with documented energy savings. Higher savings are demonstrated in opt-in programs that challenge residential customers to achieve energy savings goals. Although it is difficult to estimate the regional savings potential for all sectors, the projected savings for the residential sector in the Northwest is significant if such programs become widespread.

BPA'S STRATEGY

BPA has initiated the following three-part strategy that aims to enable, validate and increase the amount and persistence of energy savings achieved through behavior-based energy efficiency programs in the Northwest:

Monitor and Assess National and Regional BBEE Programs and Promote Best Practices. BPA will conduct research and assess the effectiveness of program design strategies and tactics, sharing the results with its customers and others in the region interested in BBEE. BPA currently holds monthly meetings for customers to share information about behavior-based programs. Utilities from the Northwest and elsewhere are invited to present their experience and findings in implementing BBEE programs. In addition, BPA lead staff participates in national forums on BBEE, including E-Source, AESP, CEEP and ACEEE, in an effort to establish best practices from which Northwest utilities can learn.

Create policies that help build program infrastructure all Northwest utilities can use to operate BBEE programs and achieve related energy savings. BPA has established an internal working group on BBEE made up of staff from all parts of the energy efficiency organization (programs, marketing, engineering, planning, contract administration, Smart Grid). This group reviews policies to encourage BBEE programs and address barriers to implementing BBEE programs. In the April 2011 implementation manual, BPA created a new path for customers to book savings from BBEE programs. The path involves acceptance of an application, ex-post evaluation and proven cost-effectiveness. Members of the internal team also serve as members of an ad hoc team assembled by contracts administration to review utility applications for custom programs for BBEE activities.

Collaboration with Northwest Utilities. There is much to be learned about strategies and tactics that best motivate behavior-based energy efficiency for various target markets, as well as effective methods for validating energy savings and tracking persistence of savings over time. BPA is planning to release a funding opportunity announcement for innovative behavior-based energy efficiency pilots. Through the resulting awards, BPA will work with regional Customer Utilities to test innovative behavior-based energy efficiency approaches with promising benefits in terms of energy savings.

FUTURE DIRECTION

Although still in the pilot stage, the industrial sector has already developed BBEE offerings for customers with High Performance Energy Management. The experience gained through such pilots and this BBEE strategy will allow BPA and its Customer

Utilities to learn more about BBEE tools and tactics and determine whether and how to best integrate them with other offerings.

Because BBEE programs are still fairly new, it is too soon to tell whether BPA should continue to encourage and reimburse utilities for independent efforts or look to construct regional programs that would be offered to any Customer Utility. Such a regional program may take advantage of inherent economies of scale, create cohesion in messaging and tie to other program offerings.

APPENDIX A: BPA DEPARTMENTS: CROSS-SECTOR ACTIVITIES

BPA's conservation activities are supported by a range of cross-sector and interdependent business functions and processes. Each of these departments, along with regional stakeholders, plays a key role in facilitating the transition from measure identification through deployment and verification. A discussion of regional stakeholders and their role in regional energy efficiency appears in Section 1.4. Descriptions of BPA's energy efficiency departments and its role in delivering energy efficiency measures and programs are provided in the following sections.

Engineering

BPA's energy efficiency engineering services apply technical expertise to identify, implement and verify electrical efficiency improvements towards a sustainable environment. They have a core expertise in the measurement and verification of energy efficiency measures. Engineering services has consistently been highly valued by BPA customer utilities, as reported in customer surveys and other feedback. Engineering assistance has been a key request from BPA customers during Post-2011 discussions. Their work primarily falls into three categories:

INNOVATION & TECHNOLOGY RESEARCH

BPA provides energy efficiency emerging technologies and R&D thought leadership to meet near-term and future technical challenges in energy efficiency. Energy Efficiency adheres to the research, project management principals and general direction of BPA's office of Technology Innovation, which oversees all of BPA's research (outside of Fish & Wildlife).

The Energy Efficiency Emerging Technologies (E3T) team leads BPA's efforts to research new, viable energy efficiency technologies and provide verifiable data to BPA and the RTF to support approval and measure deployment (described in greater detail below). The goal of E3T is to provide a robust pipeline of energy efficiency technology offerings to BPA's customers that contribute substantively to meeting the region's conservation targets.

IMPLEMENTATION SUPPORT

The engineering team lends its technical expertise to acquiring energy savings as part of the implementation team (programs, marketing and engineering), including support for the activities outlined in Section 3. This is done largely in conjunction with Customer Utilities as a member of BPA's EE customer service team. The engineers assess and support the implementation of custom projects, assist Customer Utilities with M&V activities, research deemed measures, provide opportunity development and technical support for pilot projects, train Utility Customers and program implementers, and provide engineering input as needed to support initiatives across all sectors. When BPA offers new deemed measures, call volume from customer utilities increases substantially. BPA engineers respond to questions about applications, clarifications about specifications and exceptions.

Because many of BPA's Utility Customers do not have technical in-house staff, they rely on BPA engineers for technical support. Engineers in field offices across the region

support customer utilities with M&V plan development and assist with metering on complex projects and provide technical assistance. Because of the volume of new measures that must be developed and fielded to meet the 6th Power Plan targets and the expected increase in Customer Utility energy efficiency efforts, BPA expects and has already begun to see increased customer requests for engineering services.

TECHNICAL SUPPORT

The engineering team's technical support for energy efficiency covers four major areas:

Programs. The engineers provide technical leadership for BPA and its customers in acquiring, verifying and facilitating conservation resource acquisition through training, regional and national collaboration, setting standards, conducting M&V, creating tools and calculations, and thought leadership.

Contracts. The engineers conduct technical reviews of customers' reported savings claims to verify compliance with contract terms. They also provide technical oversight of opportunity implementation.

Planning and Evaluation. The engineers provide technical support for planning activities, calculating energy savings, the Regional Technical Forum and program evaluation.

Program Marketing. The engineers serve as a technical resource for customer utility energy efficiency representatives (EERs) in all sectors.

Individual engineers may support any of this work and for a variety of end-uses. BPA's higher savings targets have prompted a review to ensure the department is structured to deliver operational excellence and as noted above, to assess the increase in resources needed to deliver these functions. BPA is currently reviewing the engineering department's structure to determine if a more vertical alignment of engineering staff around specific technology areas or sector expertise would provide greater efficiency. In addition, a customer technical needs assessment is required to better understand utility customers' technical needs.

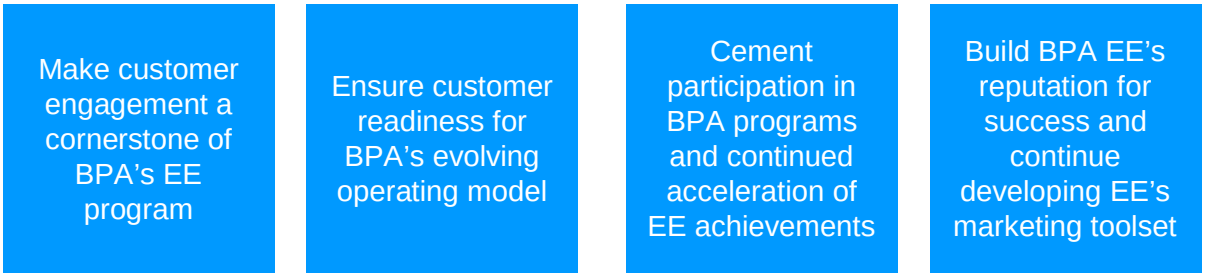
An additional area of expected growth is training and metering. BPA provides metering equipment (through a lending library) to several customer utilities that do not have the metering equipment needed to conduct M&V on custom projects. BPA also provides technical assistance to the engineering department and customers as well as training for utilities

The commercial sector may require more technical support as its measures and programs are more complex and dispersed. The engineering team also must be flexible to support new program and technology areas, such as demand response, onsite renewable energy (as it becomes cost effective), smart grid implications for End-users and more.

Marketing

The EE marketing team follows four strategies that organize the actions and approaches of the marketing department. The strategies provide an organizing principle to ensure

communications and customer engagement activities that the marketing team provides are aligned to complement and propel the achievement of BPA's energy efficiency goals. Additionally, each of the proposed focus areas, described below, is mapped to one of these pillars.



Strategic Pillar 1: Make customer engagement a cornerstone of BPA's EE program

As a Federal power marketing agency whose primary marketing statute directs it to acquire conservation as a resource, BPA relies on its retail Utility Customers for in-market implementation across the bulk of programs BPA offers. With the exception of limited direct acquisition efforts, BPA acquires conservation through its Utility Customers whose retail loads are supplied with power purchased from BPA. It is the retail loads or End-users that are critical in realizing cost effective conservation since their participation generates energy savings. Program marketing will undertake key actions to improve customer engagement and communications.

Strategic Pillar 2: Ensure customer readiness for BPA's evolving operating model

With significant shifts in BPA's funding policies on the horizon, it is critical that customer needs and concerns are integrated into BPA's policy setting process. Similarly critical, BPA must ensure that customers understand the implications of BPA's post-2011 policies and are prepared for changes at the beginning of FY2012. Program marketing will systematically communicate with customers, identifying and mitigating gaps in information and customer understanding.

Strategic Pillar 3: Cement participation in BPA programs and continued acceleration of EE achievements

BPA invests heavily in program design and implementation to best ensure BPA maximizes regional energy efficiency achievements. These investments only provide a return when Utility Customers adopt BPA's programs and excel in their execution. Therefore, program marketing will integrate marketing communications expertise into sector and initiative execution and provide support for capability formulation.

Strategic Pillar 4: Build BPA EE's reputation for success and continue developing EE's marketing toolset

No matter how strong BPA's relationship with customers or how effective our programs are at achieving regional energy efficiency, BPA's future role depends on a heightened awareness of and appreciation for the regional operating model BPA administers. Therefore, program marketing will build a "Value Campaign" to build the story of our contributions with our stakeholders.

BPA's program marketing function has only recently been staffed with targeted expertise to build out BPA's marketing offerings to utilities and for utilities to leverage into the market. The team must continue its focus on developing skills and the tools required for success. Program marketing will undertake a variety of projects to hone its focus, skills and tactics for the future.

Contracts

The Contracts Department performs three primary functions for Energy Efficiency: (1) energy conservation contract management, (2) supply chain contract management and (3) policy development and implementation.

Energy Conservation Contract Management

- **Customer Contracts**: The Contracts Department leads Energy Efficiency in the development, negotiation and implementation of Energy Conservation Agreements (ECAs). ECAs provide an umbrella framework for BPA's energy conservation funding and incorporate the requirements of the Energy Efficiency Implementation Manual.

- **Energy Efficiency Implementation Manual:** The Contracts Department manages the biannual publication of the Implementation Manual, which contains the requirements for customer implementation of BPA energy efficiency programs.

- **Federal Program Contracts:** The Contracts Department oversees the development, negotiation and implementation of agreements under the Energy Efficiency Federal Program.

Supply Chain Contract Management

The Contracts Department coordinates with BPA's Internal Business Services organization to develop supply chain contracts on behalf of Energy Efficiency. In this process, the Contracts Department assists with contract strategy (e.g., decision analysis on best type of contract for the services/materials needed). reviews statements of work, provides supply chain contract training, performs data entry, and leads communication and resolution of issues between Energy Efficiency and Internal Business Services.

Policy Compliance and Development

The Contracts Department develops, reviews, and improves Energy Efficiency and BPA-wide policies, procedures and requirements (e.g., Energy Efficiency Funding Policy, Energy Efficiency Electronic Contract Filing Policy, Office of Management and Budget Circular A-123, BPA Delegations of Authority, and BPA Marketing and Sales Policies, Procedures and Internal Controls).

Planning and Evaluation

The Planning and Evaluation Department manages BPA's strategic objective to ensure the development of all cost-effective conservation on the loads BPA serves. Planning and Evaluation supports the conservation acquisition process in various ways, including:

- Reviewing the regional energy savings and load management targets and approximate costs, which are primarily determined by the Council and the RTF, and integrating these measures into BPA's planning and implementation efforts.

- Bringing new measures to the RTF for review and working with programs staff to not only estimate reimbursement levels for approved measures but also add the measures to the PTR system.

- Managing data and tracking from customer utilities through the PTR and energy efficiency database systems and developing monthly and annual reports on achievements and costs.

- Overseeing process and impact evaluations as well as M&V and integrating the results into future opportunity design.

- Coordinating with regional stakeholders to develop long-range policies that provide a platform for effective energy efficiency acquisition. The planning and evaluation department supports this process in various ways, recognizing that the work overlaps and must be coordinated effectively with opportunity implementation, engineering and contract management staff.

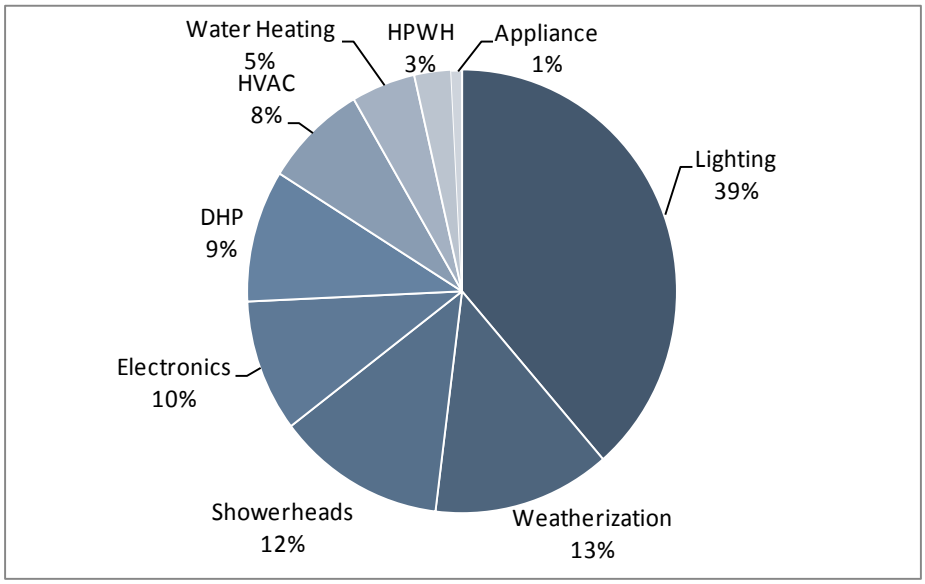
APPENDIX B: 6TH POWER PLAN DETAILS

The graphs below summarize the cost-effective energy savings potential in the Council's 6th Power Plan for each energy efficiency sector. More information about the energy efficiency potential and targets in the 6th Power Plan can be found on the Council's Website at http://www.nwcouncil.org/energy/powerplan/6/default.htm.

Residential Sector

The 6th Power Plan indicates that potential in the residential sector is dominated by lighting, followed by weatherization, showerheads and electronics, as shown in Figure 1.

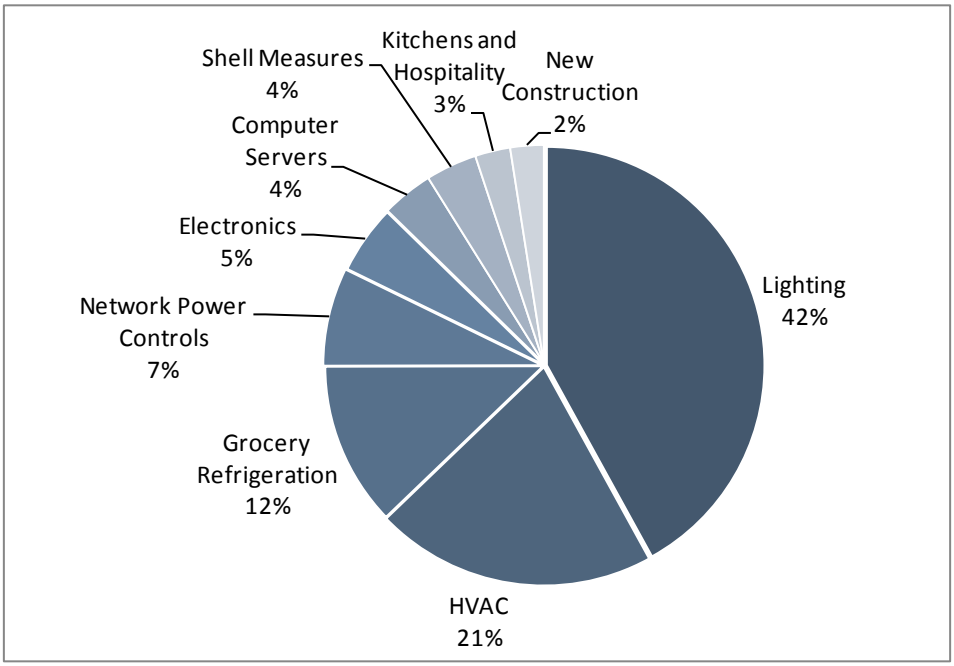
Figure 1. Residential Sector 6th Plan Potential by Measure Category



Commercial Sector

The 6th Power Plan indicates that potential in the commercial sector is dominated by lighting, followed by the grocery refrigeration and network PC power management, as shown in Figure 2. A diverse bundle of HVAC measures also constitutes a significant portion of aggregate potential.

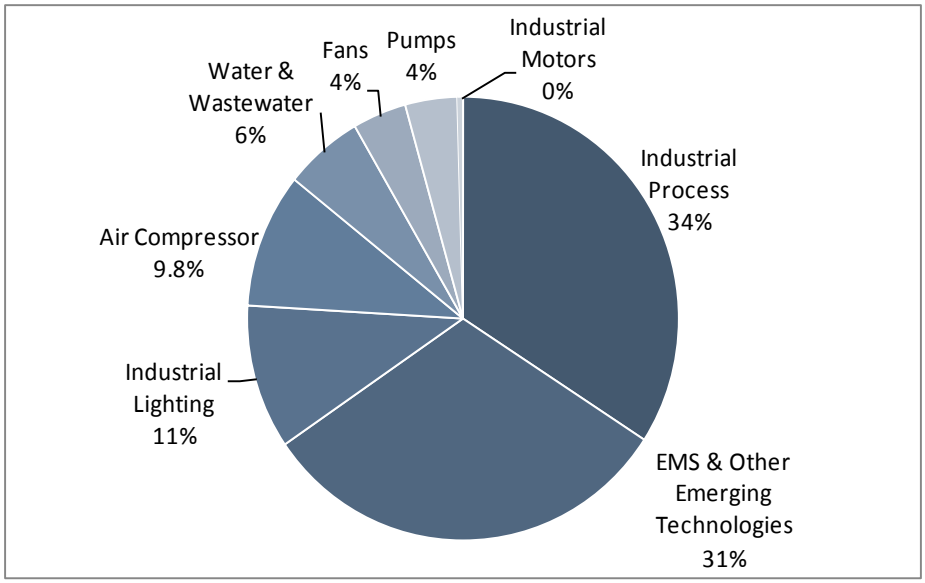
Figure 2. Commercial Sector 6th Plan Potential by Measure Category



Industrial Sector

The 6th Power Plan indicates that potential in the industrial sector is dominated by industrial process upgrades and energy management systems, followed by lighting, as shown in Figure 3.

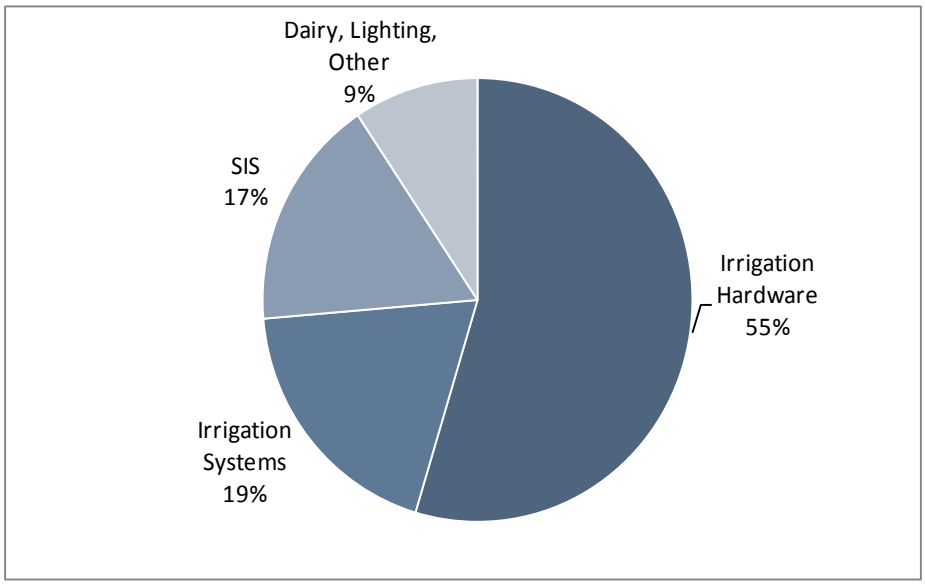
Figure 3. Industrial Sector 6th Plan Potential by Measure Category



Agricultural Sector

The 6th Power Plan indicates that potential in the agricultural sector is dominated by irrigation hardware and irrigation system motors, as shown in Figure 4.

Figure 4. Agriculture Sector 6th Plan Potential by Measure Category



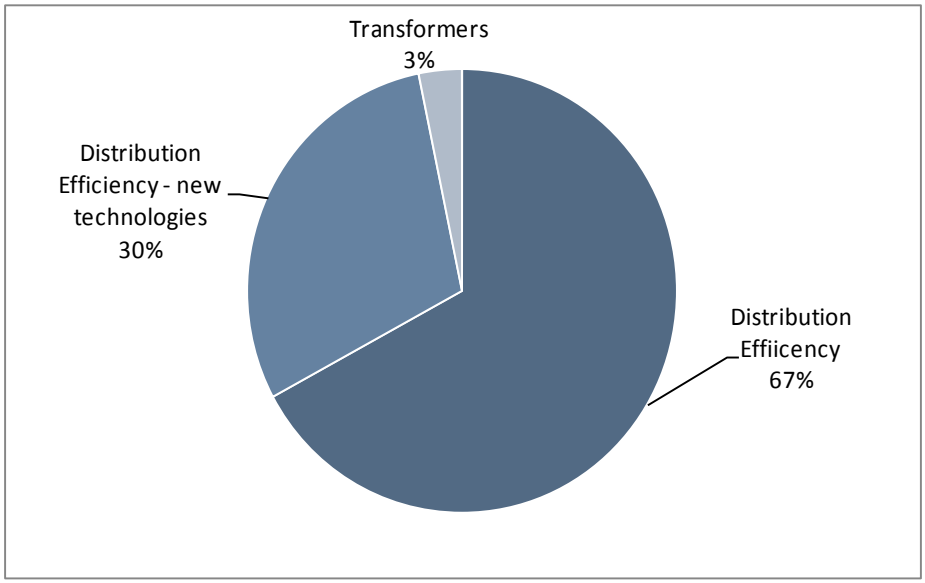
Federal Sector

Federal sector savings potential is not specifically broken out in the 6th Power Plan. Based on an assessment of the achievable potential, BPA expects the federal sector will generate approximately 18 aMW of savings during the plan period.

Distribution System Efficiency Sector

The 6th Power Plan indicates that potential in the distribution system efficiency sector is dominated by existing technologies, as shown in Figure 5.

Figure 5. Distribution System Efficiency 6th Plan Potential by Measure Category



APPENDIX C: ABBREVIATIONS & ACRONYMS

aMW	Average Megawatts
BFTE	Bonneville Full-time Employee
BPA	Bonneville Power Administration
C&I	Commercial and Industrial
CAP	Community Action Programs
CEI	Continuous Energy Improvement
CFL	Compact Fluorescent Lamp
CFTE	Contract Full-time Employee
COTR	Contracting Officer's Technical Representative
Council	Northwest Power and Conservation Council
CRC	Conservation Rate Credit
CVR	Conservation Voltage Regulation
DEI	Distribution Efficiency Initiative
DSE	Distribution System Efficiency
DSF	Direct Served Federal
DHP	Ductless Heat Pump
DOE	Department of Energy
E3T	Energy Efficiency Emerging Technologies
ECA	Energy Conservation Agreement
EECBG	Energy Efficiency and Conservation Block Grants
EEI	Energy Efficiency Incentive
EER	Energy Efficiency Representative
EM&V	Evaluation, Measurement and Verification
EMS	Energy Management System
EPRI	Electric Power Research Institute
ESFP	Energy Smart Federal Partnership
ESI	Energy Smart Industrial
ESRP	Energy Smart Reserve Power
ESUE	Energy Smart Utility Efficiency
ETAC	Emerging Technology Advisory Committee
ETO	Energy Trust of Oregon

FAP	Federal Agency Program
FTE	Full-time Equivalent Employee
GPM	Gallons per Minute
HPWH	Heat Pump Water Heater
HVAC	Heating, Ventilation and Air Conditioning
HWM	High Water Mark
KAM	Key Account Manager
LDC	Line Drop Compensation
LED	Light Emitting Diode
LIHEAP	Low Income Home Energy Assistance Program
MAP	Manufactured Home Acquisition Program
M&V	Measurement and Verification
NEEA	Northwest Energy Efficiency Alliance
NEEM	Northwest Energy Efficient Manufactured Homes Association
NEET	Northwest Energy Efficiency Taskforce
O&M	Operations and Maintenance
PTCS	Performance Tested Comfort Systems
PTR	Planning, Tracking and Reporting system
PUD	Public Utility District
RC&D	Regional Conservation and Development Council
Recovery Act	American Reinvestment and Recovery Act
R&D	Research and Development
RPF	Reserve Power Federal
RTF	Regional Technical Forum
SEP	State Energy Program
SIS	Scientific Irrigation Scheduling
SISL	Scientific Irrigation Scheduling Light
TAG	Technology Advisory Group
TAN	Trade Ally Network
TIO	Technology Innovation Office
TSP	Technical Service Provider
UES	Unit Energy Savings
USB	Utility Sounding Board
VFD	Variable Frequency Drive
VO	Voltage Optimization

VSD	Variable Speed Drive
WAP	Weatherization Assistance Program