Key Personnel Drive Energy Projects for Industry

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ABSTRACT

How can an industrial facility implement electrical industrial projects while addressing the barrier of *limited staff* or *lack of manpower*? A robust, regional industrial program was recently designed to address the different goals and needs of serving utilities and their industrial end users in the Pacific Northwest.

The Bonneville Power Administration's (BPA) Energy Smart Industrial (ESI) program provides a regional, holistic approach. One key feature of the ESI program's Energy Management Pilot is the Energy Project Manager (EPM).

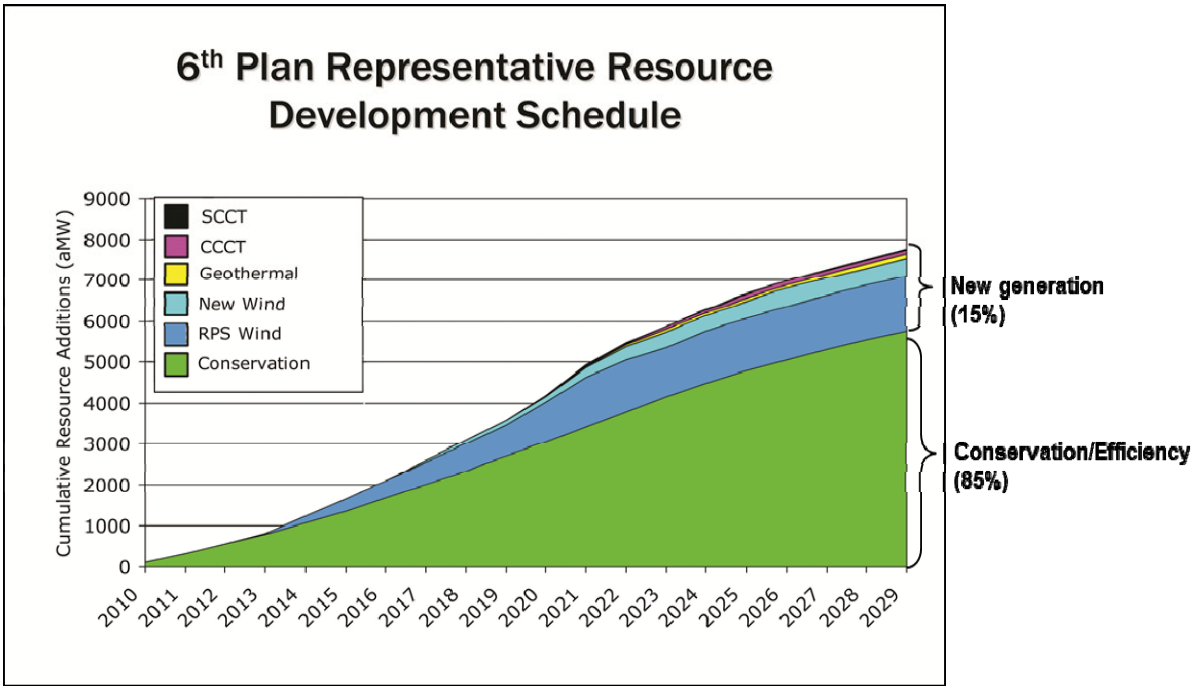
Currently the ESI program is actively co-funding 18 EPMs at 22 different industrial plants served by 15 different electrical distribution utilities; seeing an uptake in project development. In order to ensure success, both facility management and plant engineering staff needs to readily support this position and see the potential effect on the plant's overall energy usage.

The EPM is not exactly an efficiency measure, but a means to drive projects; identifying energy saving opportunities and managing projects from 'cradle to grave.' In FY2010, 1.69 aMW savings from completed projects were on EPM Comprehensive Plans, while 10.04 aMW savings potential from projects are identified for completion in FY2011. This paper will outline the ESI component's design and processes established, the qualifications and requirements, share the achievements from actual facilities, and provide some of the lessons learned along the way.

Introduction

In February 2010, the Northwest Power and Conservation Council (the Council) released its 6th Power Plan (Power Plan), which provides a 20-year demand forecast and resource plan for the Pacific Northwest region. Updated every five years, the Power Plan guides the Bonneville Power Administration's (BPA) electrical resource and conservation strategy. With the release of the Power Plan, the Pacific Northwest aims to address 85% of new load growth by cost-effective EE, as illustrated in Figure 1.

Figure 1. Pacific Northwest Electric Resource Development Schedule[i]



[Source: Northwest Planning and Conservation Council, Sixth Power Plan]

In forecasting the conservation potential for the industrial sector, the Council, with technical and financial support from BPA, evaluated 63 conservation measures and practices as they apply to Northwest industries. This assessment demonstrated that a combination of new technologies, improved operations and maintenance (O&M) practices, and the adoption of an energy component into existing business management systems could collectively contribute to an increase in the 20-year industrial sector savings potential; from 350 aMW to 800 aMW. Approximately 35% of the future potential was found to be available by the application of "whole plant energy management practices," as defined in the Council's Systems Optimization Measures Guide[ii].

With the objective of achieving the Council's industrial sector efficiency targets, BPA set out to incorporate an Energy Management Pilot in to their new Energy Smart Industrial (ESI) program. The Energy Management Pilot was established with three discrete features, designed to address specific needs of regional industrial companies. In October 2009, BPA launched the ESI program and released the Energy Project Manager (EPM) feature to address the common referenced need for a mechanism to fund dedicated staff positions assigned to managing EE (EE) at industrial facilities. The other two features are Track and Tune (T&T), and High Performance Energy Management (HPEM). These additional Energy Management pilot features address O&M opportunities (T&T) and guide organizations to further develop their energy management practices (HPEM).

Addressing the Personnel Constraint

Historical observations of energy project development lead to the conclusion that a primary impediment to the identification and completion of EE projects was a lack of dedicated

resources with accountability for implementation lead time and verified energy savings. The EPM feature is designed to provide salary co-funding for individuals with responsibility for planning and implementing energy projects in large industrial end users throughout the Pacific Northwest region. The ultimate goal of the EPM feature is to increase end user management and engineering efforts dedicated to electrical EE, thereby increasing the quality and magnitude of projects being submitted through the ESI program. The core principle of the EPM component is that the participating industrial end user establishes a 12-18 month EE goal of at least one million kWh/yr savings, in collaboration with their serving utility and the ESI program. The industrial end user then receives EPM salary co-funding proportional to the magnitude of achieved savings. The EE goal is comprised of a portfolio of capital projects and energy management projects, with the latter category being delineated into system O&M, whole facility O&M, and management systems and practices. An individual project is eligible for EPM co-funding if it aligns with one of the individual ESI program components, and is approved by the serving utility and BPA. The EPM salary co-funding is a separately issued add-on to the base incentive for the individual projects, which recognizes the value the EPM provides by identifying higher quality projects, and delivering the savings in a more expedient timeframe.

The total level of EPM salary co-funding is calculated according to the following guidelines[iii]:

1. Verified Savings basis: $0.025 per kWh of verified annual savings
2. Minimum annual co-funding = $25,000 (basis: 1 million kWh/yr x $0.025)
3. Maximum annual co-funding = The lesser of the fully loaded EPM salary or $250,000

EPM co-funding is not a measure in itself, but rather a means of driving the completion of individual measures within the context of an established project portfolio. As such, the EPM co-funding is separated in to four separate progress payments, which recognize key achievement milestone of the EPM. Table 1 summarizes the EPM progress payment schedule.

Table 1. EPM Progress Payment Schedule

EPM Payment	Milestones	EPM Payment Methodology
1a	a. BPA and Utility approve EPM Funding b. EPM Agreement Executed c. EPM Designated	$25,000
1b	EPM Comprehensive Plan Approved	1/3 of energy savings goal at $0.025 per kWh, less Payment 1a
2	6 month Status Report accepted by utility and BPA	2/3 of energy savings goal at $0.025 per kWh, less Payment 1a and 1b
3	EPM Completion Report accepted by utility and BPA	100% of verified energy savings at $0.025 per kWh, less Payments 1a, 1b, and 2. Subject to $250,000 and EPM salary caps.

In recognition of the end user resources required to hire or assign an EPM, EPM co-funding starts before projects enter the ESI program, and well before projects are completed. For continuing EPMs in Year 2 and beyond, Payment 1 is combined into a single amount, released upon utility and BPA approval of the EPMs project portfolio, as documented in the EPM Comprehensive Plan.

Strategic Placement of EPMs

The ESI program considers several factors when considering placement of an EPM. First, a facility needs to have a sufficient connected load to have a reasonable chance of meeting the minimum saving goal of 1,000,000 (one million) kWh/yr within a 12-18 month timeframe. While no official minimum facility size is programmatically mandated, the EPM feature is best suited for facilities with a connected load of 3 aMW or more, as this ensures the EPM can meet the program requirements with a modest savings target of ~4 to 5% of the facility's total energy use. Facilities with less connected load may successfully meet the program goals in Year 1, but will be challenged to extend the EPM term beyond the first year.

Second, while the ESI program seeks to engage customers that have a known personnel constraint, the facility's management must have a strong inclination to support energy projects with funding and peripheral manpower support from other departments. An ideal application for an EPM is a company that has historically implemented a modest number of capital projects, but hasn't aggressively pursued large capital EE measures or O&M projects due to a lack of internal bandwidth. EPMs that achieve their savings targets are generally functioning within organizations that have a culture of continuous improvement and metric-based performance management. Cascade Steel Rolling Mills, located in McMinnville, Oregon is a steel manufacturing facility that takes recycled metal and turns it into high-quality finished steel products. Founded in 1968 and then acquired by Schnitzer Steel Industries, Inc. in 1984; and being a energy intense manufacturing facility, through the ESI program's EPM, they've been able to introduce cost efficiencies and state-of-the-art environmental controls into our operations. Through the company's increased commitment to efficiency, Dan Helgerson, a Certified Fluid Power Specialist, serving as that plant's Energy Project Manager told an audience (BPA's Energy Efficiency Utility Summit, May 10, 2011), "*it is this commitment to increased efficiency and to the needs of our local community that has led us [Cascade Steel] to pursue the programs offered by BPA under the Energy Smart Industrial program and specifically to the position of Energy Project Manager…Cascade Steel has successfully saved and targeted over 10 million kWhs of electricity*." These organizations also typically have a mature process for capital project planning, approval and progress review.

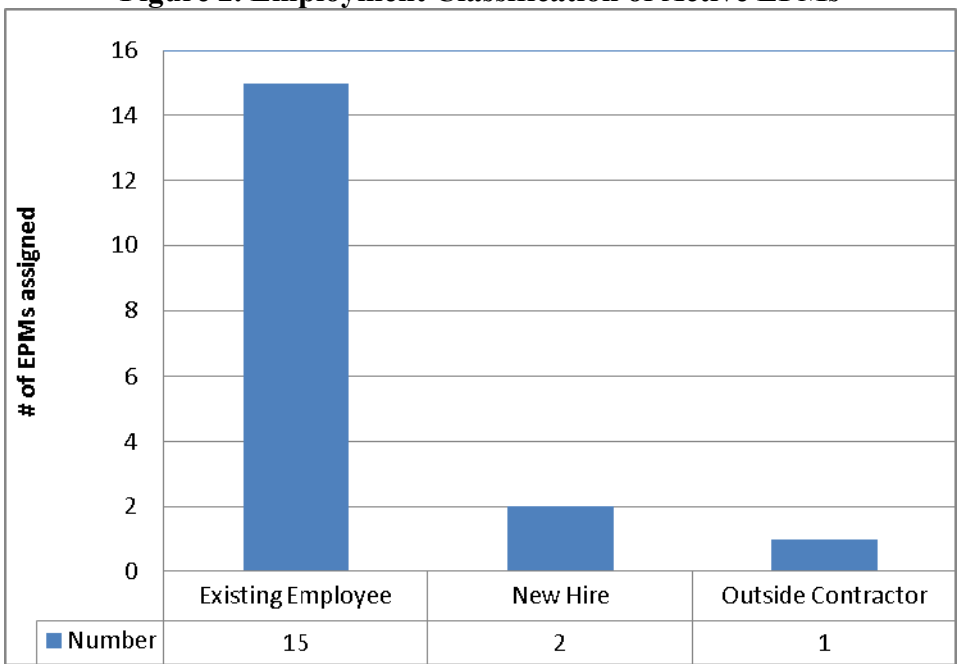
Finally, companies that are best suited for EPM are those that are driven to pursue a more ambitious electrical energy savings goal, in an effort to support a broader corporate energy or environmental objective. Experience shows that plant management is much more likely to support the EPM if their efforts and performance can be directly linked to a corporate-level goal that they have a vested interest in achieving. Such linkage may not be initially obvious, but the utility and ESI program can help identify such relationships with some targeted questions during the pre-Agreement phase. The ESI program, in collaboration with the individual assigned as EPM, can provide quantified evidence of progress towards a corporate goal or in relation to continuous improvement efforts required by recognized standards (e.g. ISO 14001). The EPM can also help convey a direct connection between their efficiency projects, and the organization's efforts to reduce controllable expenses. Table 2 illustrates the EPM goals and corresponding corporate goals for five participating sites.

Table 2. EPM Goals and Corporate Goals for Participating Sites

EPM	SIC Code	Energy Project Manager Goal (kWh/yr)			Corporate Goal
		FY2010 (actual)	FY 2011	Total	
1	36-High Tech Manufacturing	1,159,919	2,027,952	3,187,871	Reduce energy consumption rate to 66% of 1990 level.
2	26-Pulp and Paper	1,600,426	6,620,785	8,221,211	Member of The Climate Registry, with a commitment to GHG emission reduction.
3	26-Pulp and Paper	5,446,544	16,075,957	21,522,501	40% Reduction in GHG emissions by 2020
4	14-Mining	-	2,772,437	2,772,437	20% Energy Intensity Reduction by 2020
5	39-Miscellaneous Manufacturing	-	5,358,007	5,358,007	20% reduction in energy consumption (on a revenue adjusted basis) from 2007 to 2012. ISO 14001 Certified.

The ESI program is not prescriptive regarding the specific background of the EPM, nor whether participating companies assign the position to an existing employee, or hire an individual as a new employee or subcontractor. Because the level of co-funding is tied directly to savings achieved, the end user is motivated to assess the person who is best-suited to identify and complete EE projects. As shown in Figure 2, the majority of EPMs have been existing employees. Companies are generally reluctant to place new hires in the EPM role due to several factors. Aside from the additional expense of recruiting and training a new employee, companies recognize the severe challenge that a new hire would face with identifying projects, gaining financial commitment from management, and implementing projects in a timely manner. These functions are best accomplished by an existing employee with detailed knowledge of the plant, and a high level of credibility up and down the organizational structure. When an existing employee is designated as EPM, the company is encouraged to make an objective assessment of the individual's responsibilities, and if necessary, apply a portion of the EPM co-funding toward resources that can free the EPM from some of their non-energy related responsibilities. However, given the programmatic objective of addressing human resource constraints, the EPM feature is designed to support new-hire EPMs, and encourages this option when internal bandwidth is completely consumed. In these cases, it is critical for the ESI program to work alongside the EPM, and provide additional coaching and training resources. In these cases, an 18-month EPM term is recommended, as progress within the first 6 months may be limited.

Figure 2. Employment Classification of Active EPMs



The majority of EPMs are degreed engineers with at least two years of experience managing facility-related projects. While the ESI program encourages credentials such as Professional Engineer (PE) Licensure or the Certified Energy Manager (CEM), neither of these are program requirements, so long as the lack of credentials isn't an internal impediment to the EPMs ability to function within the context of their specific role. As small number of EPMs come from disciplines outside of engineering, but have extensive backgrounds in production or project management.

The EPM Comprehensive Plan

After an EPM is assigned, the Energy Smart Industrial Partner (ESIP) supports the EPM in developing the first deliverable, the EPM Comprehensive Plan. The EPM Comprehensive Plan includes a list of EE projects, ballpark estimates of project costs and energy savings, a timeline for project development and implementation, and the total energy savings goal for the EPM agreement term. The establishment of the energy savings goal is a critical milestone, as this defines the level of EPM co-funding for Payments 1b, 2 and 3. The project included in the Comprehensive Plan typically include a combination of known opportunities that have been previously identified, and new ideas generated from ESI-sponsored assessments. The ESIP will typically work with the EPM to assess whether low cost O&M opportunities exist within the facility, in an effort to create a balance of capital and non-capital initiatives. Once timelines are established for the planned projects, the EPM and serving utility can decide whether to target a 12-month term, or utilize the full 18-months permitted by the ESI program. Generally, a 12-month term is suitable unless the EPM comprehensive plan includes long lead time capital projects, or the EPM is pursuing savings under the other Energy Management pilot features. In either case, 18 months is typically necessary for a project to evolve from the scoping phase, to

final M&V and project completion. While the 18-month term provides the EPM with greater scheduling flexibility, the co-funding level is still capped at the annual (12 month) salary of the EPM, providing addition motivation for efficient scheduling.

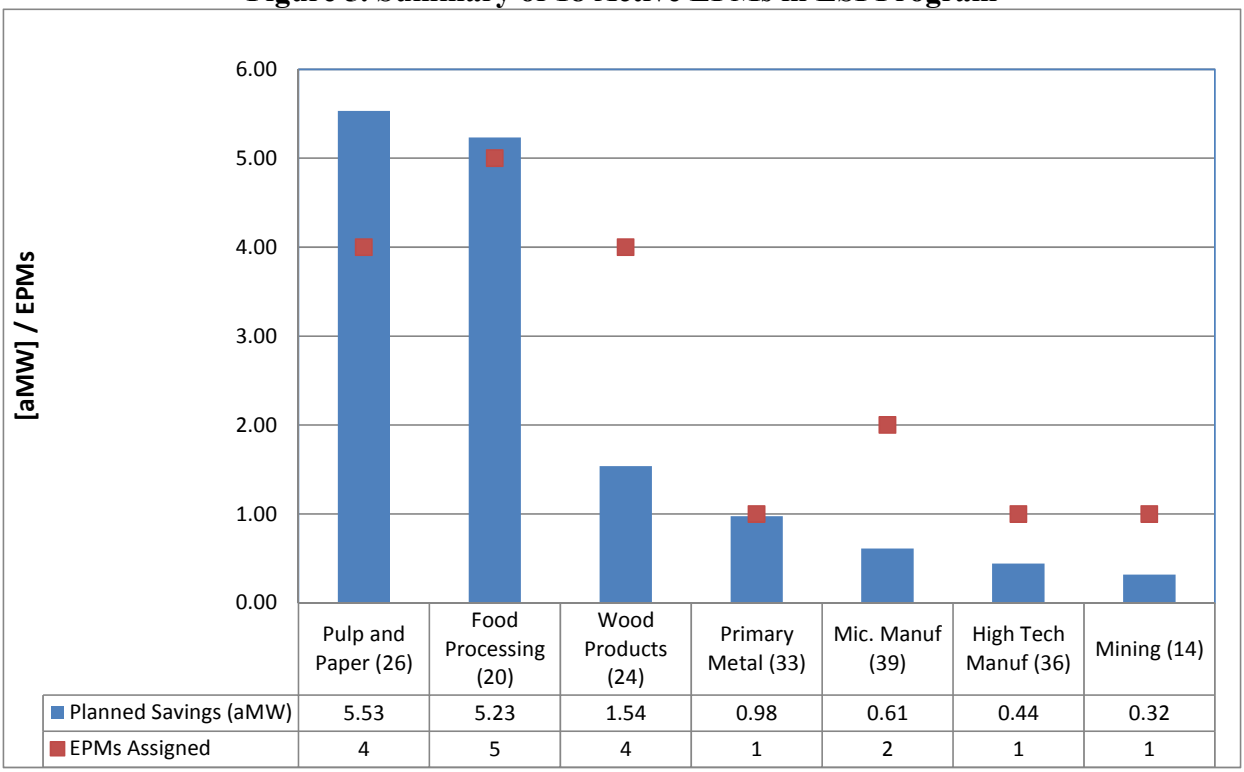
Once approved by the serving utility and ESI program, the Comprehensive Plan provides a roadmap for the EPM to track progress toward achievement of their energy savings target. In most cases, the Comprehensive Plan is frequently referenced by site management, utilities, and the ESI program for monitoring the progress of individual projects and the aggregated results from the EPMs efforts. This single point of reference helps drive internal and external accountability for the EPM. At the 6-month milestone, the EPM Comprehensive Plan is updated to include the status of each project, and a record of any verified savings. Likewise, at the 12-month milestone, verified savings are recorded for completed projects. The sum of verified savings provides the basis for the final payment.

After the end of the first year, the utility and ESI program will make an assessment regarding the continuation of the EPM co-funding to a second year. While this decision is expected to be largely based on first-year performance versus goal, it will also include factors such as the facility's commitment to a second project portfolio of greater than one million kWh/yr, the EPMs inclination to pursue more complex projects or those projects involving a behavioral or O&M component, and industrial sector efficiency budget priorities for the utility. The ESI program is targeting a >75% renewal rate for first-year EPMs, in an effort to promote the development of "energy experts" at regional industrial sites over the long term.

Regional Uptake

The EPM feature was first reviewed with industrial sites in January 2010. Over the following ten months, 18 EPM agreements were executed between serving utilities and end users. Figure 5 shows the distribution of EPM placement by industry, and the respective savings targets.

Figure 5. Summary of 18 Active EPMs in ESI Program



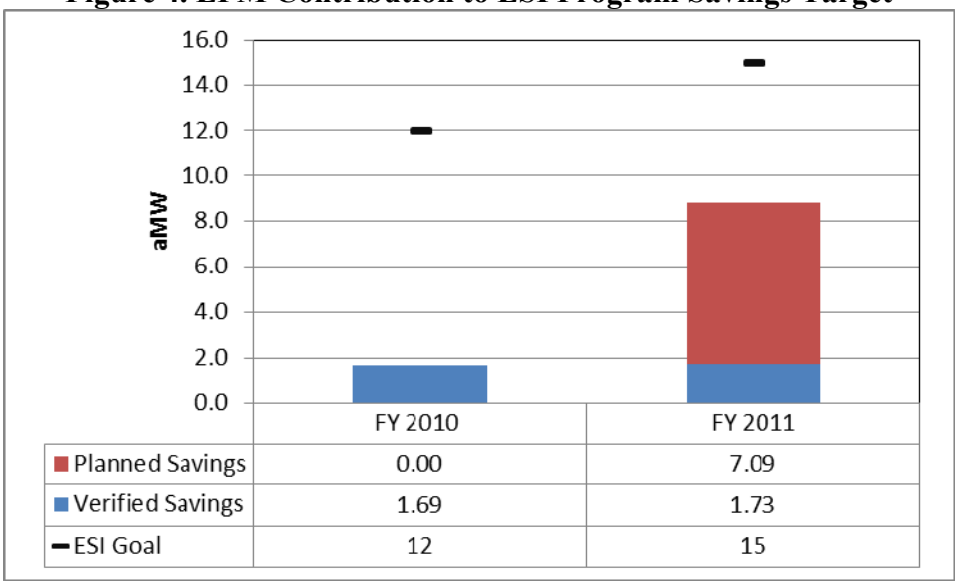
	Pulp and Paper (26)	Food Processing (20)	Wood Products (24)	Primary Metal (33)	Mic. Manuf (39)	High Tech Manuf (36)	Mining (14)
Planned Savings (aMW)	5.53	5.23	1.54	0.98	0.61	0.44	0.32
EPMs Assigned	4	5	4	1	2	1	1

EPM placement by industrial subsector should, in theory, align with the industrial conservation potential profiles for the territory served by BPA. The 6th Power Plan's industrial-sector conservation assessment estimates the pulp and paper sector has the highest 20-year potential at 300 aMW, followed by the food processing & storage sector at 150 aMW, and wood products sector at 70 aMW[1]. This comparison provides general validation that EPMs are being placed in strategic locations. Further efforts will be made to determine if EPMs can help drive further savings in the refinery and chemical processing subsectors, which have a disproportionally low representation in current efficiency project activities. Near the mid-point of the ESI program's Energy Management pilot, it can be concluded that the EPM feature can be an effective means of increasing savings among a broad range of industries, but other opportunities should be explored to place EPMs in subsectors not represented in the initial group of 18 companies.

EPM's Contribution to Regional Targets

At the outset of the ESI Energy Management pilot, it was assumed that EPMs would drive approximately half of ESI program savings in FY 2011. Of the 18 active EPMs, 13 have Comprehensive Plans that are approved by the utility and the Bonneville Power Administration. Figure 4 shows that in FY 2011, EPMs have completed 1.7 aMW of projects, and have another 7.1 aMW planned, for a total of 8.8 aMW total contribution. This represents 58% of the FY 2011 program goal of 15.0 aMW.

Figure 4. EPM Contribution to ESI Program Savings Target



The EPM-driven project pipeline for FY 2012 will start to develop as the remaining three Comprehensive Plans are finalized, new EPMs are identified, and existing EPMs submit their second year plans.

In collaboration with the serving utilities and ESI program, EPMs are identifying a wide range of efficiency measures to meet their goals. Table 3 summarizes the measure category and associated savings for 96 measures listed on the Comprehensive Plans that are approved by BPA.

Table 3. Efficiency Measures in Approved EPM Comprehensive Plans

Measure Category	Total Planned Savings (kWh/yr)	Individual Measures
Lighting Upgrades	14,998,861	13
Refrigeration Measures	14,872,929	14
Process Specific Measures	13,436,798	7
Energy Management (T&T)	11,604,108	7
Pump Measures	10,155,152	11
Fan Measures	9,580,012	17
Refiner Upgrades (Pulp & Paper)	9,360,000	4
Compressed Air Measures	5,960,011	13
Motor Measure	2,747,013	3
Chilled Water Measures	2,702,773	2
Energy Management (HPEM)	2,350,811	5
Grand Total	**97,768,468**	**96**

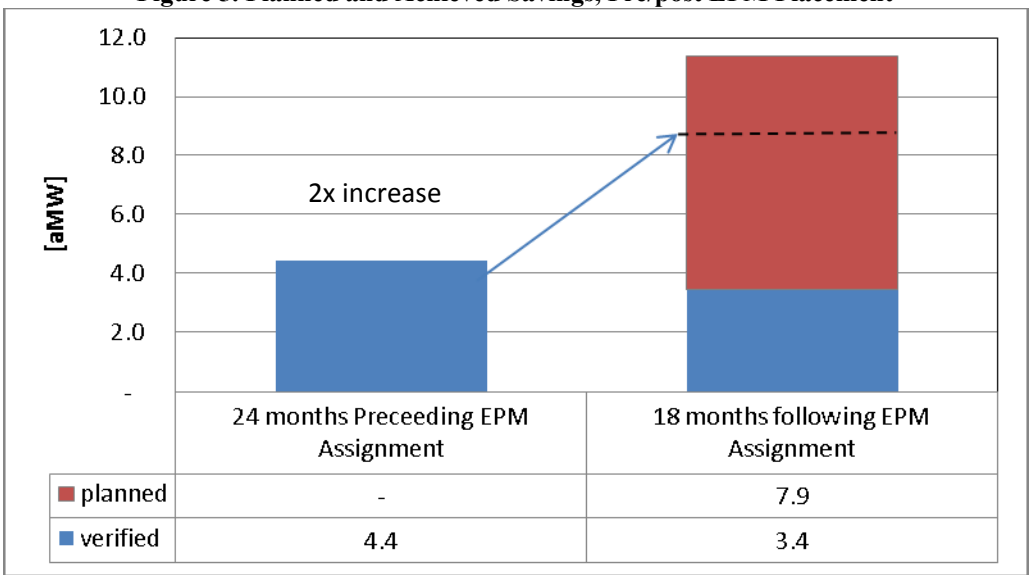
Lighting has emerged as the top category in the first year, with 80% of participating facilities pursing one or more lighting projects. Process-specific measures are largely concentrated in the pulp and paper sector, and relate to capital upgrades on process-specific equipment (e.g. paper machines). The Energy Management measures relate to ESI Track and Tune and High Performance Energy Management engagements, which seek to identify no-cost/low-cost EE improvements through an O&M-based or behavioral-based approach. In the

future, EPMs are expected to play a key role in increasing the proportional contribution from the process-specific measures and Energy Management categories.

Is the EPM a Difference Maker?

The stated objective of the EPM feature is to increase the number of projects, and magnitude of savings in the ESI program. Figure 5 shows a comparison of savings performance for the 2-years preceding EPM placement, versus the planned savings during the EPM term. This analysis includes the 13 companies that have approved EPM Comprehensive Plans. On average, those 13 companies are in month seven of their first-year term.

Figure 5. Planned and Achieved Savings, Pre/post EPM Placement



If we apply a conservative estimate of a 70% completion rate on the balance of the "planned projects", we can project that the 13 EPMs will achieve 8.8 aMW of verified savings in the 18 months following their individual Commencement Dates. Comparing this figure to the two years preceding EPM placement, one observes a doubling of the achieved savings from the participating sites. Comparable industrial sites without EPMs increased verified savings by 35% during a comparable period, which can be attributed to increases the ESI custom project incentive level.

Benefits from a Utility Perspective

Fifteen public utilities in the Pacific Northwest are participating in the EPM feature, and the feedback received to date has been overwhelmingly positive. Some of the common benefits valued by participating utilities include the establishment of a single point of contact at their largest industrial end users, and the EE budgeting and savings forecasting provided by the EPM Comprehensive Plan. Doug Swier, Conservation Engineer at Cowlitz County PUD, is actively working with EPMs placed at two large industrial end users in his service territory. Mr. Swier summarized the benefits of the EPM in the following statement: "*Since the inception of EPM Agreements with two key customers, there has been a noticeable increase in the rate of custom projects being entered into the pipeline and also completed by these customers. It appears that*

the EPMs themselves are mindful of the fact that their salaries are largely being supported through EPM incentives, and are therefore diligent to keep opportunities moving along to completion. The EPM Comprehensive Plan with definite milestones at definite time intervals is a good vehicle to encourage this personal accountability."

The ESI program will continue to actively solicit input from participating utilities in order to refine the EPM pilot moving forward.

Conclusions

Three indicators can be used to provide an early assessment of ESI program's EPM feature. First, regional uptake has met initial expectations, with 18 EPMs being placed at large industrial sites, spanning 7 of the subsectors outlined in the Council's industrial sector conservation assessment. Several additional EPMs are in development, and ESI is targeting placements in the chemical manufacturing and waste water sectors.

Second, EPM-managed projects are forecasted to comprise over 50% of the 15 aMW FY 2011 industrial-sector saving goal. This goal represents the highest industrial-sector savings target in the history of the BPA program, and the EPMs will be a vital resource in accomplishing this ambitions objective. The future role of EPMs will be more critical, as savings from O&M related projects become a large portion of the ESI program savings.

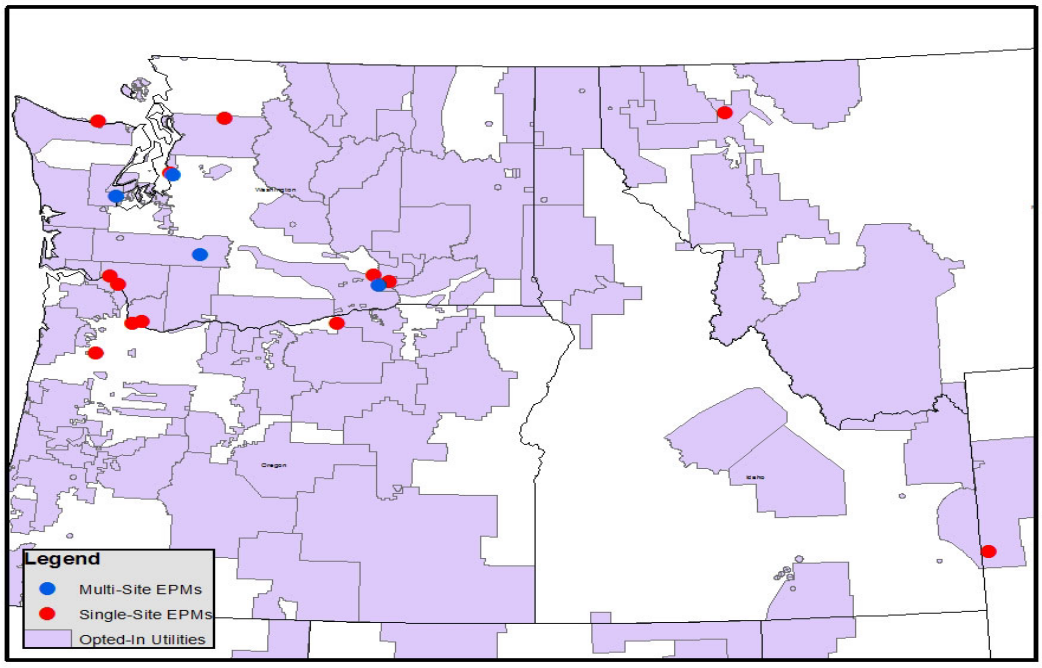
Finally, a comparison of historical savings performance to post-EPM forecasted savings provides a conservative estimate that EPMs will double the rate of verified savings at participating industrial sites. While this increase in project uptake is critical to achieving the Council's industrial sector savings targets, more time is required to assess the overall cost effectiveness of the EPM feature.

As the 18 EPMs approach the 12-month milestone, the ESI program has an opportunity to develop a strategy to further engage and develop those EPMs that will proceed to a second term. A primary focus should be to increase efforts to connect EPMs with the suite of regional training resources available through the ESI program, serving utilities, NEEA, and the U. S. Department of Energy. With one year of historical experience, the ESI program staff has a firm understanding of the types of targeted training that would benefit individual EPMs, and an EPM Training Plan should be incorporated in to the second-year EPM Comprehensive Plan. Another opportunity to further develop the existing cohort of EPMs is for ESI to facilitate scheduled EPM workshops. Given the geographic dispersion of the EPMs (see Appendix 1); these meetings would need to be scheduled well in advance, and include web-based participation options. However, these workshops would provide a valuable opportunity for technical training and review of emerging energy management technologies and practices. Equally valuable would be the sharing of actual experiences, and general networking among a group that shares a common objective to save energy in their industrial facilities.

The ESI program will continue to collect data on other key indicators including the implementation rate on planned projects, total lead time for EPM-managed projects versus standard projects of similar size and complexity, and the magnitude of new projects opportunities identified over the course of the first year of the EPM term. While improvements are expected in each metric, the ESI program will ultimately determine the success of the EPM pilot by reviewing a broad range of indicators, and relying on input from a third-party facilitated program evaluation. Over time, the EPM feature will be continually reviewed and refined to ensure that it

is providing BPA's utility customers and regional industry with an effective solution for addressing the human resource constraint, while supporting the ESI program's mission of driving cost-effective EE projects in the industrial sector.

Appendix 1. Energy Project Manager Placements within BPA Service Area



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