BPA's "Case for Conservation": Helping Public Power Utilities Make the Business Case for Energy Efficiency

Matt Tidwell, Bonneville Power Administration

ABSTRACT

Since the passage of the 1980 Northwest Power and Conservation Act (Power Act), the Bonneville Power Administration (BPA) has worked collaboratively with its publically-owned retail utilities to acquire energy efficiency as the region's least-cost resource. Despite relatively low wholesale power rates in the region, BPA and its public utilities have been national leaders in energy efficiency acquisition.

Beginning in early 2012, BPA's Power Services organization worked to develop two analyses and a financial model to help put "energy efficiency as the least-cost resource" in business terms for BPA's publically-owned utilities (POUs). This initiative includes assessing the value of energy efficiency from the regional, utility, and service area perspectives. The initiative's cornerstone is a tool called the "Utility Service Area Conservation Financial Impact Model." This model uses utility-specific inputs and assumptions to help POUs assess the quantitative impacts of energy efficiency from both the perspectives of the utility and its consumers. With a transparent and objective look at utility lost revenues, rate impacts, and the net benefits accrued by consumers, the model helps POUs do a more thorough analysis of their efficiency programs, including quantifying not just short-term rate impacts, but as importantly the benefits in terms of consumer bill savings and wealth remaining in their service areas. The goal behind the model is to help the region's POUs broaden the discussion beyond lost revenues and short-term rate impacts and thereby contribute to increased utility support of energy efficiency acquisition.

Maximizing "Owner" Rather than Shareholder Value

Central Lincoln Public Utility District (PUD) is a publically-owned electric utility covering 112 miles along the Oregon coastline and serving over 38,000 residential and 4,000 commercial customers. In 2013, utility staff designed and implemented a Conservation Voltage Regulation (CVR) pilot project with the intent of lowering voltage at the consumer meter level. Doing so provides the same electric service but with fewer kilowatt hours (kWh) as well as fewer distribution system losses. Based on the success of the pilot, utility staff proposed extending CVR across the entirety of the PUD's service area. However, the proposal met with resistance from the PUD's general manager due to her concern about the project's impact on the utility's revenues because CVR would reduce the number of kWhs sold to the PUD's consumers. The PUD does not need the revenue in order to maximize shareholder value, as is the case for Investor Owned Utilities (IOUs). Rather, the PUD, like most publically-owned utilities (POUs), relies on selling kWhs and therefore generating revenue in order to recover its fixed costs. As a result of the PUD's retail rate structure (like many POUs), the utility recovers fixed costs in its volumetric rates, so as the utility sells fewer kWhs, the PUD must look elsewhere in order to recover its fixed costs—this can often take the form of higher retail rates.

It was not until the Bonneville Power Administration (BPA) asked Central Lincoln to beta-test a new energy efficiency financial impact model BPA had developed that the project finally got off the ground. During the beta-test, the PUD staff decided to run the CVR project through the model. The model offered a unique quantitative approach to the project (and any efficiency project) by analyzing its financial impact on the utility, mainly in terms of the cost from the CVR investments as well as resulting lost revenues, along with the financial impact on consumers in terms of their investment cost and utility bill savings.

The model demonstrated that the CVR project would have an overall negative impact on the utility of approximately $216,000 annually. However, the model demonstrated an approximate net benefit to the PUD's consumers of $12 million over the 20-year life of the project. Over those twenty years, this net benefit translates into approximately $8 million staying within the PUD's service territory in the form of bill savings rather than that wealth leaving the area. Once the general manager saw the financial impact of the CVR project packaged in this way, where the PUD's owners win out despite revenue losses to the utility and potential future rate implications, she became an advocate of the project. With her backing the project, the PUD's board members voted unanimously to proceed with the service-wide CVR project, which is projected to result in approximately 6 million kWhs of energy savings annually.

In short, the BPA model helped shift the conversation from one centered on utility lost revenues to one that included maximizing the value to the utility's owners. This paper provides background context before moving into how BPA's financial impact model quantitatively brings together the utility and consumer perspectives in support of energy efficiency investments by POUs in the Pacific Northwest.

BPA's Energy Efficiency Role in the Pacific Northwest

The Bonneville Power Administration (BPA) is a federal nonprofit agency based in the Pacific Northwest. BPA markets wholesale electrical power from 31 federal hydro projects in the Columbia River Basin, one nonfederal nuclear plant and several other small nonfederal power plants. About one-third of the electric power used in the Northwest comes from BPA. The agency also operates and maintains about three-fourths of the high-voltage transmission in its service territory, which includes Idaho, Oregon, Washington, western Montana and small parts of eastern Montana, California, Nevada, Utah and Wyoming (BPA 2014).

Public power in the Pacific Northwest has a long, unique history of delivering measurable energy efficiency results. The cooperative mix of public power utility customers, vendors, contractors, state agencies, regional associations, and BPA has delivered more than 10,500 GWhs in energy savings to the Northwest since the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Power Act) was passed (BPA 2012).

As part of BPA's Power Services organization, the Energy Efficiency (EE) organization develops resources on the demand side of electrical meters and its core mission has been the regional development of energy efficiency and acquisition of energy savings.

Under power sales contracts that took affect on October 1, 2011, BPA pursues energy efficiency in partnership with 133 publically-owned utilities (POUs) within BPA's service territory. These POUs are organized as municipal, public utility districts, and cooperatives. BPA is a wholesale provider of power to these retail utilities who then distribute power to their consumers. More than 100 of the retail POUs serve 100% of their loads with BPA power. The remaining utilities serve their loads with a combination of power from BPA and non-federal resources. Through energy efficiency agreements BPA makes funding available to the POUs in exchange for reliable energy savings. In this way, BPA has both a seller (power) and buyer (energy savings) relationship with its customers.

Case for Conservation Initiative – Objective and Drivers

BPA's EE organization is dedicated to providing value to its utility customers since it is the POUs that make it possible to accomplish BPA's energy savings targets. From regional programs, to technical assistance for custom projects, the EE organization is always looking for ways to facilitate the energy savings acquisition work of BPA's utility customers.

The current realities the region is facing have created headwinds to the pursuit of energy efficiency:

- The region is still reeling from the economic crash of 2007-2008. Many BPA customers are experiencing no-to-low load growth with energy efficiency potentially putting upward pressure on retail rates;
- For the first time BPA public utility customers on average are expected but not required to deliver 25 percent of BPA's regional programmatic savings target because of a new funding model put in place in 2011, meaning some have to justify efficiency investments beyond the funding amounts received by BPA; and,
- Despite a BPA tiered rates methodology for power that is supposed to provide a clear price signal for investing in energy efficiency, many utilities are not facing Tier 2 price signals as a result of having access to affordable Tier 1 power for the foreseeable future.

To help address these issues, in early 2012 BPA launched a "Case for Conservation" initiative entailing some analyses and a financial model to assist its customers with making an economic case for energy efficiency. The case can be made at many levels and BPA has examined the impact of efficiency from the regional, utility customer, and consumer perspectives as follows:

- To address the regional perspective BPA developed an analysis of the value (defined as cost savings) of energy efficiency achievements over the past 10 years against the cost of purchasing power (using the region's Mid-Columbia spot market price point). By posing the hypothetical alternative of purchasing from the market the equivalent amount of power that was saved through energy efficiency investments from 2001 through 2011, the analysis demonstrates BPA's efficiency savings acquisition has led and will continue to lead to reduced costs on the order of $750 million to $1.7 billion (net present value in 2011), depending on which assumptions are used.
- To address the retail utility perspective "A Utility Business Case for Conservation" was created. This guidance document establishes a framework for a utility to analyze individual financial and rate situations using its own costs and assumptions. To support the economic conclusions made in the analysis a separate document was developed to address many elements of conservation that cannot be captured in a general business case analysis.
- To address both the retail utility and consumer perspectives BPA developed a financial impact model based on utility-specific inputs and assumptions to help BPA's POUs think about the quantitative impacts of efficiency investments.

The initiative is meant to be a limited economic analysis of the impact of energy efficiency from multiple perspectives. The initiative was not intended to provide a full and comprehensive picture of the impact of energy efficiency in the region or in any BPA customer's service territory. Rather, the analyses are meant to assist BPA's POUs with effective planning of their energy efficiency programs. Analyses relating to the first two perspectives are available on BPA's website (BPA 2013). This paper focuses on the financial impact model.

BPA's Conservation Financial Impact Model

The "Utility Service Area Conservation Financial Impact Model" provides a financial tool based on utility-specific inputs and assumptions to compare the cost of energy efficiency to the cost of wholesale power purchases (or new resources) and provides an objective and transparent assessment of energy efficiency's impact on revenue requirements, rates and consumer bills.

Main Take-Away

Assuming "reasonable"[1] assumptions and inputs, the model generally shows a net benefit to the utility service territory as a result of investing in energy efficiency. The appeal of the model is that it:

- Demonstrates the financial impact of energy efficiency to the utility's revenue requirement;
- Translates that revenue requirement impact into rate impact terms, which allows the user to put potential rate impacts in the context of all the other rate pressures being faced by the utility; and,
- Calculates the net benefit to the service area by calculating the average bill savings to consumers and combining that with the net impact to the utility.

The hoped for longer term implication of the model is that it will improve both qualitatively and quantitatively the discussion about retail utility investments in energy efficiency. Qualitatively, the model allows for a more comprehensive look at energy efficiency. In today's world, the conversation can be monopolized by the concern (albeit legitimate) about energy efficiency's impact on utility lost revenues and short-term rate impacts. In tomorrow's world, the model has the potential to broaden the conversation to consider the overall benefits brought to the service area and consumers as a result of investing in energy efficiency. Bringing about this more complete story, however, may rest—for many utilities—on the quantitative horsepower of BPA's new model.[2]

[1] For example, very high utility costs of energy efficiency along with short term measure lives generally result in a net cost to the utility service area.

[2] It is likely surprising to the reader that a similar model was not previously developed. A principal reason was the tiered rates for BPA electricity. Approximately 50 BPA POUs are never expected to face Tier 2 rates. Since many of those utilities have access to affordable Tier 1 power through 2028, the question of the prudency of efficiency investments often arises.

What's the Story at the Retail Utility Level?

Despite energy efficiency being the lowest-cost, lowest-risk[3] resource and, therefore, a seemingly economic no-brainer, BPA's retail utilities vary greatly in their support of acquiring energy efficiency. On one end of the spectrum, some utilities have very robust efficiency programs and conservation is a part of the utility's DNA, while at the other end, some utilities remain skeptical. Skepticism could result from a variety of reasons, such as the utility not believing savings are real or a concern about lost revenues and, therefore, potential upward pressure on retail rates.

Utilities less willing to embrace energy efficiency are concerned about rate impacts and equity. In the absence of significant load growth, which is the case for many of BPA's utilities, energy efficiency can contribute to higher rates as a result of most POUs in the region recovering a large amount of fixed costs in their volumetric rates. The consequence of this is that as a utility sells fewer kWhs, be it from efficiency, distributed generation, or even weather variation, it experiences "lost revenues" and has fewer kWhs across which to spread its fixed costs. Thus, it may need to raise its rates in order to fully recover its fixed costs.

The POUs want low rates because board members and general managers are usually assessed based on their ability to keep (or promise) low rates. Therefore, despite the clear economic rationale for investing in energy efficiency, political drivers resulting from retail rate design, in many cases, trump the otherwise sound economic drivers.[4]

Two indirect benefits that have positive political implications help to counterbalance the utility concern about higher near-term rates from energy efficiency. The first is that energy efficiency is a localized resource that rests on a local workforce, i.e., many efficiency measures can only be installed by trained, on-the-ground contractors that usually live in the area, thus contributing to jobs in often economically hard hit areas in the Northwest. So, instead of power coming from outside the service area via wholesale power purchases, energy efficiency delivers "negawatts" through local jobs. The second near term indirect benefit results from the economic multiplier effect of energy efficiency. Consumers invest in conservation, which results in lower power bills and more money in their pockets relative to had they not invested in energy efficiency. This money is then partially spent in the utility service area; increasing wealth for all as a result of the economic multiplier phenomenon. Figure 1 below demonstrates the important indirect economic cash flow benefit of energy efficiency that is particularly important to BPA's rural and economically hard-hit utilities.

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[3] Energy efficiency is the lowest-risk resource in terms of hedging against unpredictable, future power system conditions, despite savings predictions sometimes not materializing.

[4] Other POUs are able to partially or fully overcome the rate pressure concerns for a number of reasons, including general end-user support (the "culture" of the service area), state mandates, and serving load growth at lowest cost.

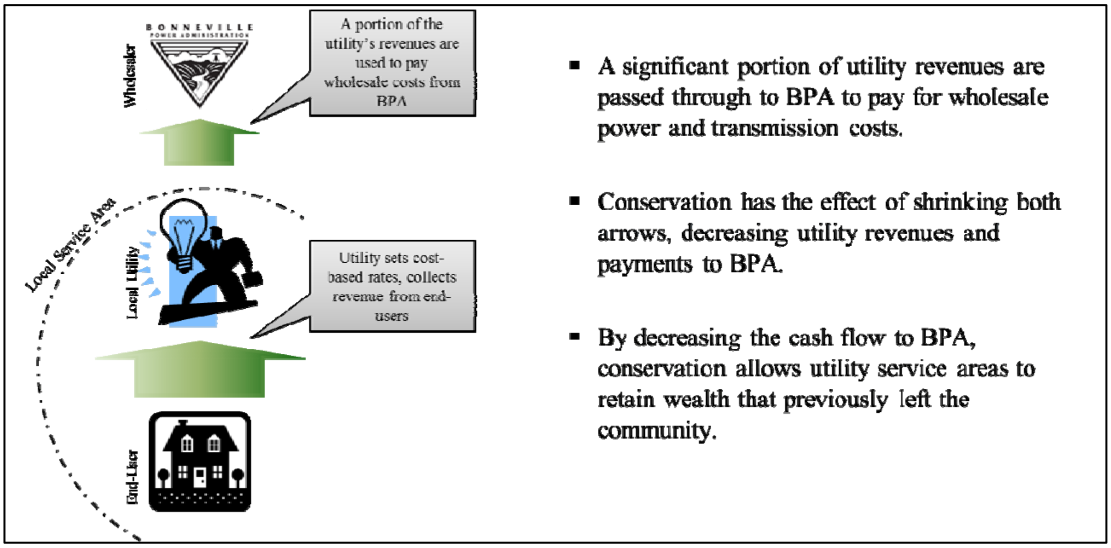

Figure 1. The cash flow of conservation.

Despite the aforementioned benefits of conservation, some POU managers and board members are likely to continue to express concern about inequity for "non-participants," i.e., those consumers who do not directly invest in energy efficiency (and do not see reduced power bills) but experience higher rates and, therefore, higher bills in the near term. It is unlikely that any justification or benefit of energy efficiency will make the concern about "non-participants" go away,[5] but it is important to point out two additional considerations that should help put the concern within the context of the more comprehensive assessment of energy efficiency:

First, there is a direct link between programmatic efficiency savings (those energy savings resulting from utility incentives paid to consumers) and those that result otherwise, such as from changes to codes and standards (non-programmatic savings). Programmatic savings have often driven non-programmatic savings that result from more efficient codes and standards. And consumers who end up never being "participants" in utility programs (such as low income residents) benefit from more stringent codes and standards. For example, Americans move residences frequently and as the residential building stock turns over and becomes more efficient, non-participants benefit from moving into more efficient buildings. An observer can see that the Northwest has some of the most efficient codes and standards relative to the rest of the country, but they did not result accidently –they were driven by utility programs and "participants" showing certain levels of efficiency to be cost-effective and achievable.

Second, thinking about energy efficiency as a resource acquisition helps illustrate that the discussion about acquiring traditional "steel in the ground" resources usually does not entail a separation between "participants" and "non-participants" despite the fact that a subset of consumers is driving the utility need to acquire and, therefore, leads to higher rates for all consumers. It is only reasonable that investments in energy efficiency are considered through the same lens of not distinguishing between those who participate and those who do not.

[5] The concern is mitigated if all or nearly all consumers are participants (either via utility programs or outside of utility programs) considering a longer term perspective, e.g., 10+ years.

What's the Story at the Consumer Level?

Consumers experience both direct and indirect benefits of investments in energy efficiency. First, those consumers who invest in efficiency measures on their own or via utility programs experience lower power bills as a result of consuming fewer kWhs. This is generally understood, but POU managers and board members are sometimes quick to point out that those who do not make the investments see only higher power bills as a result of higher rates resulting from others investing in energy efficiency (and, therefore, contributing to lost utility revenues). This line of thinking however misses the very important indirect benefits a utility service area experiences as a result of energy efficiency. The indirect benefit of primary importance for POUs in the Pacific Northwest and their consumers is that wholesale power rates today are as low as they are because of the region's investments in conservation since the 1980 Power Act. Energy efficiency is now the region's second largest resource behind hydro power. Energy efficiency, by reducing total demand, has allowed the region to continue to rely on hydro power (the cheapest form of power) for almost half of its needs. Energy efficiency has thus enabled the region to avoid more reliance on more expensive fossil or renewable energy that would have led to higher wholesale rates for all POUs and their consumers. The same logic applies going forth. Energy efficiency is the lowest cost resource and helps hold down rates over the long run, which is a benefit to all consumers regardless of which ones actually make the efficiency investments.[6]

Combining These Two Stories to Arrive at a More Comprehensive Assessment of Energy Efficiency

The purpose of the BPA "Utility Service Area Conservation Financial Impact Model" (made available to BPA's POUs in November 2013) is to combine the above stories: on the one hand, the impact from energy efficiency to the POU in terms of lost revenues and rate impact, and, on the other hand, the financial impact to consumers. The model is Excel-based and has several worksheets that capture almost every variable needed to quantify the financial impact of energy efficiency, including BPA's rate structure, utility-specific data (such as load forecast) and utility-determined inputs (such as the utility's cost of conservation). The model can be used for a variety of purposes, some of which are provided below:

- **Timing**: the model can assess the financial impact of one year's worth of energy efficiency in a given year or in multiple years.
- **Amount**: the model can assess the financial impact of any amount of energy efficiency and could be used to determine the preferred level of savings acquisition, depending on the utility's interests.
- **Scenario Comparison**: the model can be used to run various "scenarios" based on varying the inputs.
- **Measure Composition**: the model can be used to assess the financial impact of a single efficiency measure or a portfolio of measures. This flexibility allows for comparing measures against each other.

[6] Aside from rates and bill benefits, energy efficiency also provides a multitude of non-energy benefits. See RAP 2013.

The horsepower of the model is focused on crunching the energy benefits of energy efficiency, but no financial impact analysis would be complete without the ability to consider the non-energy benefits of energy efficiency. Accordingly, the user is able to enter separate values for utility and end-user non-energy benefits, which get factored into the overall outcome.[7]

Sample Results

Table 1 shows the model's typical result in terms of a net service territory benefit and reflects a real "Utility A" using reasonable utility inputs and assumptions. Although the model's sophistication generates many results for consideration by the user, the summary report captures the main financial impacts in a simple table. In this example, Utility A will capture approximately 112 GWh of energy efficiency between 2014 and 2028; approximately a 4.13% reduction in the utility's 2028 forecasted load.

Table 1. Outcome of a model run for Utility A

Utility Revenue Requirement Impacts				% of Cumulative Elec. Revenues
Utility Conservation Investment		$	3,672,322	0.3%
BPA Incentive Payments	-	$	3,671,701	
Conservation Investment Less BPA Payments		$	621	0.0%
Avoided Wholesale Power/Transmission Costs	-	$	5,334,454	0.4%
Lost Retail Revenue	+	$	9,030,593	0.7%
Non-Electric Energy Utility Benefits	-	$	-	0.0%
Net Cost to Utility Revenue Requirement		$	3,696,761	0.3%
End User Impacts				
End Users' Power Bill Savings		$	9,030,593	0.7%
End Users' Conservation Investment (Less Rebates)	-	$	3,672,322	
Non-Electric Energy End User Benefits	+	$	-	
Net Savings to End Users		$	5,358,271	
Net Service Territory Benefit Over 15 Years		$	1,661,510	

The first part of the table demonstrates the financial impact of the above amount of energy efficiency on the utility's revenue requirement over the fifteen year time period. The first line captures what the utility spends on incentives to consumers (assuming the utility, on average, pays 50% of the efficiency cost). From this cost, the model subtracts the amount the utility receives from BPA as payment for the energy savings. It is important to note that these payments are originally collected from the utility in BPA's power rates and although it may look like the utility is getting $3.6 million worth of efficiency for only $621, that is not the case as the model accurately captures the full amount the utility spends on energy efficiency. The next calculation is how much the utility avoids in terms of power and transmission costs as a result of buying less power and transmission service from BPA. The "Lost Retail Revenue" line captures the foregone utility revenues as a result of selling 112 fewer GWh to its consumers. The next line

[7] For a comprehensive look at non-energy benefits, see RAP 2013.

captures the non-energy benefits of energy efficiency that are entered by the user (for this model run such benefits were left out so as to provide a conservative example). Combining the above additions and subtractions gives a net cost of approximately $3.7 million to the utility's revenue requirement.[8]

Turning to the consumer impacts, the table shows the total amount of bill savings shared by consumers. Importantly, this is the total savings across all consumers and does not distinguish between "participants" and "non-participants." But the consumers do not get the efficiency savings for free, so the next line captures their cost for purchasing the efficiency measures net the incentives received by the utility (here assumed end-users pay the other 50% of the costs). The user is able to enter consumer non-energy benefits, which have purposively been left blank in the example for purposes of being conservative. These costs and benefits translate into a total net savings of approximately $5.4 million to end-users.

The real value of the model is that it shows the net benefit to the service territory, which captures both the impacts to the utility and its consumers. The net benefit effectively captures the fact that the utility can make up its net cost of $3.7 million by collecting that amount from its consumers while still leaving approximately $1.7 million in the pockets of the utility's consumers. The net benefit amount brings back the focus on the economic multiplier effect of keeping more dollars in the utility's service area and how important that positive economic "spillover" is for many of BPA's economically hard hit service areas. This surely will not completely assuage the concern about lost revenues and higher rates, so to help put the rate impact in context, the model also translates the $3.7 million cost to the utility into a rate impact. Although rate setting is complex, the model shows the rate impact of recovering the $3.7 million in terms of either a higher energy rate or customer rate. Regarding the energy rate, were the utility to hypothetically collect the entire $3.7 million in 2028, a 4.06% rate increase would result, but assuming collection is annualized over the fifteen years this translates into a 0.27% per year increase. On the other hand, were the utility to hypothetically collect the entire $3.7 million in 2028 in the form of a higher customer charge, the rate impact would be a 4.69% increase. Annualized over fifteen years translates that impact into 0.31%.

The point of discussing two of the many ways to make the utility financially whole and allow it to recover all of its fixed costs is to show that, holding all else constant, the rate impact from reducing 2028 forecasted load by a bit more than 4% is rather modest if done annually or close to annually. And that this modest rate impact should be considered in the context of the plethora of benefits from energy efficiency explored throughout this paper.

Conclusion

As of April 2014, BPA had some level of engagement on the model with over 15 of its POUs with plans for additional engagement throughout the remainder of 2014. BPA's model has the potential to not only provide much needed quantitative modeling, but, more importantly, the potential to shift the long established conversation about lost revenue and corresponding rate anxiety shared by many POUs to a more comprehensive one that also focuses on the net financial benefit to a utility's service area as result of investments in energy efficiency. As the earlier example of Central Lincoln PUD demonstrates, the model can be leveraged to maximize the value of energy efficiency to a utility's owners—its consumers. In this way, POUs are quite

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[8] At this time, the model does not capture cost savings associated with deferred distribution infrastructure investments.

different than IOUs who seek to maximize shareholder value. This ownership position, therefore, allows POUs to think beyond short term rates and consider the full implications of efficiency investments, namely more wealth remaining in the service area as a result of lower consumer bills.

By developing the model and making it available to its POUs, BPA is, in a small but important way, helping to build utility support and, therefore, funding for energy efficiency that will prove critical to the next generation of savings achievements. Furthermore, the approach to broadening the conversation about energy efficiency—away from a more narrow focus on short-term rates—to one that attempts to quantify and highlight the economic benefits to the consumers of utilities could be applied throughout the country.

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