The Straight Line: Can a Sharply-focused Portfolio Deliver More Value?

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ABSTRACT

It is becoming increasingly accepted that energy efficiency (EE) is the lowest cost, first choice resource in utility supply side planning. EE savings potential is calculated across multiple sectors and markets, each with its own cost of acquisition. While overall this portfolio of measures is the lowest cost resource, current EE programs often offer a mix of lower and higher cost measures pursuing a “something for everyone” approach, rather than implementing a focused, lowest cost portfolio of savings.

This comprehensive approach has much to recommend it. Pursuit of savings across sectors, measures, and markets offers risk mitigation through diversification, delivers customer service benefits, and builds a political base to support EE generally. However, not all EE opportunities are equal in terms of cost, value delivered to the power system, and ease of implementation. This matters less when high targets and commensurate budgets demand pursuit of all energy efficiency. However, if targets are lowered or budgets restricted, the question of whether another approach could deliver more valued savings emerges.

This paper explores the implications of a theoretical shift from a diversified EE portfolio to a radically targeted approach. Through examination of the Bonneville Power Administration’s 2011 EE portfolio, the authors assess how a sharply focused restructuring would impact key value parameters, addressing the following:

- What would a portfolio look like that focused only on the bottom of the EE supply curve at a measure and sector level? What are the implications of this approach for implementation?
- Is a targeted approach realistic in the current program implementation environment?
- Is a delayed embrace of emerging technology economically rational – when should programs focus only on the over-ripe fruit?

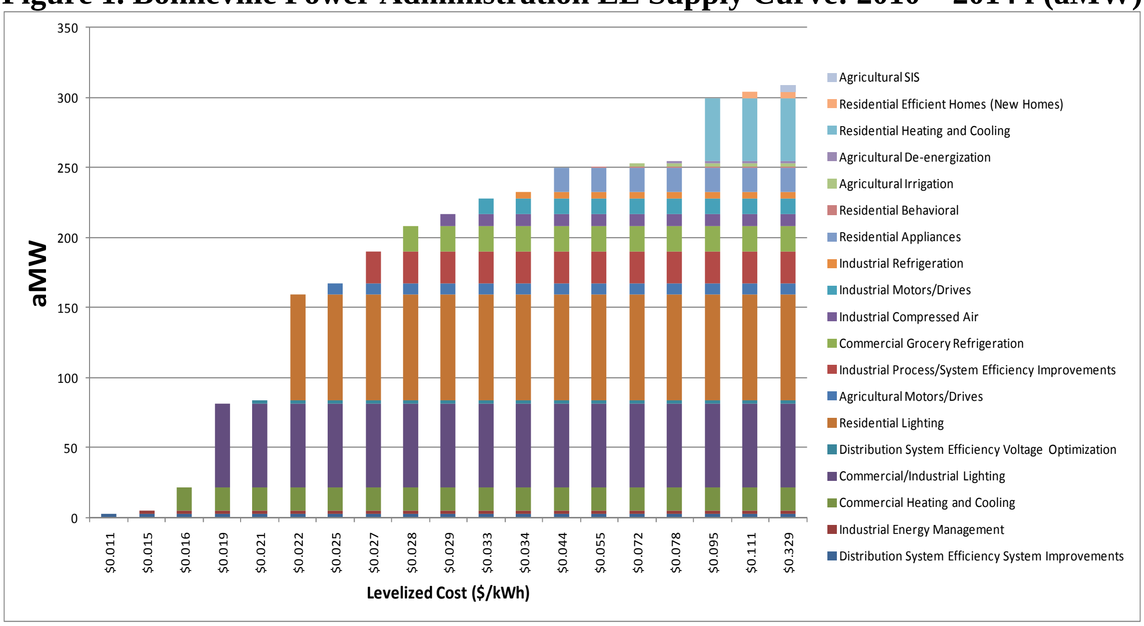
Introduction

Over past decades, energy efficiency has come into its own as a resource. It is becoming increasingly accepted that energy efficiency (EE) is the lowest cost, first choice resource in utility supply side planning. Relative to investments in new generation, EE features lower financial costs, fewer political issues, and a positive impact on the environment. National policy focus and regional planning efforts have recognized this potential and embraced EE as an integral part of the nation’s energy future. McKinsey & Company’s well-known 2009 report referenced energy efficiency as a significant, low-cost energy resource waiting to be unlocked, with potential of reducing energy consumption by up to 9.1 quadrillion BTUs by 2020 (McKinsey 2009, page iii). The Northwest Power and Conservation Council’s 6th Power Plan anticipated that energy efficiency would meet 85% of the Northwest’s load growth over the next 20 years. Large scale investments have followed, raising the profile of energy efficiency and materially impacting load growth. Indeed, the last several years have seen unprecedented success in EE programs nationwide and a transition from EE as a customer service function to EE as a relied upon supply side resource. It seems the long-touted promise of EE is being realized.

The investment in EE has been both deep and broad regionally and nationally. Faced with aggressive targets supported by record increases in budgets, planners and program managers have developed a broad suite of programs targeting a broad spectrum of market segments, measures, and practices. This wide-ranging approach has enabled EE to maintain some of its previous flavor of customer service while remaining within cost-effectiveness limitations as an energy resource.

The numerous measures implemented by these programs have varying characteristics in terms of cost, savings, simplicity, load shape, and measure life. Just as EE generally is on the low end of the power resources supply curve, some EE investments are a lower cost investment than others. While there may be a vast range of efficiency measures that fall below new generation on the supply curve, some measures may be a more cost-effective resource than others. Portfolio planners apply this knowledge to build and monitor an EE portfolio that delivers savings within desired cost parameters. Figure 1 shows the EE supply curve for Bonneville Power Administration's current programs. The current BPA portfolio of measures are managed to an average cost, recognizing that less expensive offerings (commercial lighting) can bring overall portfolio costs down and allow the ability to offer higher incentives for more expensive resources (residential HVAC) or harder to reach markets. Those measures residing further to the left of the curve represent the lowest cost savings from a levelized cost perspective, based on BPA's current Energy Efficiency Action Plan for 2010-2014.

Figure 1. Bonneville Power Administration EE Supply Curve: 2010 – 2014 f (aMW)



As a supply side resource, conventional wisdom would suggest that if enough potential exists in the lowest cost measures to meet targets, EE should focus solely on the acquisition of the lowest cost, most reliable sources of energy savings. Despite this, EE programs are often implemented more broadly than a singular focus on resource acquisition would dictate, pursuing a "something for everyone" approach across a broad spectrum of measures, sectors, and markets.

This paper examines the issue of portfolio design in EE, assessing the advantages and liabilities associated with portfolio design that attempts to include all EE measures by contrasting BPA's actual portfolio with a hypothetical, radically-focused alternative that eschews balance and market-friendliness for low cost.

The Comprehensive Portfolio Approach

What is the Comprehensive Approach?

First, this paper will examine what is referred to here as the comprehensive portfolio approach. This approach is characterized by the structure seen in many energy efficiency programs across the country. The comprehensive approach recommends the "something for everyone," diversity-focused portfolio design. Such a portfolio includes:

- Multiple sectors, markets, and end-users, for example, small commercial, large industrial, residential, multifamily;
- Multiple measure categories for full coverage of all EE opportunities, including lighting, HVAC, shell, and process;
- Multiple measures within an end-use, for example, a variety of lighting technologies within the lighting segment;
- Technologies along the continuum of adoption, from emerging technologies to tried and true technologies that are nearing market transformation;
- Multiple approaches and program designs, for example, direct install, strategic energy management, and trade ally-driven approaches.

What Does the Comprehensive Approach Achieve?

Full potential. First and foremost, the comprehensive approach provides an "all hands on deck" strategy to achieve all achievable potential when EE targets and budgets are very high and achieving targets is a stretch, even with all-encompassing programs. If the target is large enough, implementers are limited in their ability to be targeted in their approach. Additionally, the comprehensive approach serves well when regulation dictates that an entity achieve "all cost-effective conservation," regardless of where it falls on the EE supply curve.

Diversification. Diversification is generally a benefit to any portfolio approach, be it financial or supply side resources. A diversified approach shields programs from significant underachievement in any one area. In a time of economic swings, it also insulates EE programs from devastating impact from industry-specific economic downturns. Furthermore, diversification protects against significant changes in any one program or measure. For example, a significant shift in the baseline for lighting measures would have an enormous impact on a portfolio that consists of only lighting measures. Nor is the protection from diversification limited to external threats; unexpected staff attrition or operational missteps are also more easily managed in a broad portfolio.

Customer service. A diverse portfolio provides an opportunity for everyone in the customer base, whether or not those customers offer the most cost-efficient EE opportunities. In many organizations, EE has its roots in customer service and this connection has been hard to break. After all, lowering a customer's utility bill, or writing a check to a customer is often seen as a customer benefit and can deliver important support to low income populations. EE programs can also be a platform to educated and engage customers on key energy issues, which is beneficial as a utility.

Rate payer equity. Many utilities collect funding to support EE efforts through applying tariffs to customer utility bills from all sectors. It is important that for those who pay into the system to be afforded the opportunity to receive benefit from it. If a utility focuses on only a few initiatives to achieve savings, not everyone who pays into the system may be able to benefits from the offerings. Utilities that receive funding from a sector, but do not have an EE measure for them to implement may face complaints or questions from regulators.

Broadens EE support. By reaching customers and delivery partners of all shapes and sizes, a comprehensive approach builds a more expansive network of support for future EE investments. It establishes a value proposition for EE across commercial, industrial, residential, and agricultural customers, thereby broadening the network of political supporters of EE. It also helps create organizational capacity among implementation firms, contractors, manufacturers, and other delivery partners for future success – this capacity is most often contrasted with the negative industry repercussions of volatile funding – the oft-discussed "roller coaster".

Market leader positioning. Both within and outside of the EE realm, many utilities strive to position themselves as market leaders in implementation or innovators in new technology. While this prioritization of innovation supports technologies' movement along the path of adoption, it can also lead utilities and implementers to pursue technologies or approaches that build an "innovator" reputation, but do little to further acquisition of EE resources. Activity in emerging energy efficiency markets and measure areas can operate similarly, with initiatives that are interesting to the industry but may compare unfavorably to less innovative 'workhorse' programs.

What are the Potential Pitfalls of a Comprehensive Approach?

Although the comprehensive approach has much to recommend it, from a pure resource acquisition planning standpoint, it encompasses some significant risks.

High cost/low value. In creating a fully diversified portfolio, high cost or low value elements may be included in the portfolio in the name of diversification and customer service. The elements may drive up the cost of the portfolio with limited benefit from a resource perspective. For example, a streetlight retrofit component might be added to a lighting program, adding relatively low-value off-peak savings to the portfolio. Depending on program objectives and cost of this addition, its benefit may be marginal or even negative. Interestingly, these portfolio additions that are marginally aligned with program objectives also fail to deliver the promised benefits of diversification. Though the details can be complex, if there is no likely future scenario where a portfolio elements delivers value, then it may simply be a cost-element whose inclusion is not justified by economic fundamentals. An analogy to financial portfolio theory may illuminate – a financial instrument with a guaranteed negative return is an expense, not an investment, regardless of any diversification brought to the portfolio by virtue of its performance being uncorrelated with stocks or bonds. This argument certainly does not apply to all, or even most, energy efficiency measures, but where it does it is key to ensuring the value of a portfolio.

Opportunity costs. Maintaining a comprehensive portfolio requires trade-offs amongst programs in a world of limited financial resources. Future planning decisions may be driven by programmatic concerns for diversification, rather than the pursuit of the lowest cost EE resource. There is an opportunity cost to these trade-offs. Ultimately the completely comprehensive portfolio may not be achieving full potential from the lowest cost opportunities, while it is propping up higher cost, lower savings investments. This is all the more true assuming, as we do, that even programs running at capacity rarely reach full market penetration. In that context the choice to pursue a new unproven program element (which is expected to be high cost and perhaps high risk) is also the choice *not* to purchase additional proven benefits from an existing program. Taken to the extreme this concept raises some interesting questions – should the size of a large and successful lighting program be doubled, even if it means doing nothing in HVAC? There are reasons why the answer could be no, but there are also reasons, frequently discounted, why it could be a resounding yes.

Political risk. After years of building political momentum for energy efficiency as the least cost resource, a comprehensive approach to EE that does not maximize the benefit of the lowest cost resource may erode political support for EE. Essentially, EE has been pointed to as the bottom of the supply curve for resource acquisition. However, within the potential of savings, we are not beginning at the bottom of supply curve when designing portfolios. In a real sense, the resource planning thinking that created the concept of EE as a resource is abandoned, or at least not always weighed, when including high cost or low benefit program elements. The comprehensive approach to EE is not necessarily consistent with other resource planning approaches which may dictate developing the least cost achievable power source to maintain low rates. In today's volatile political climate, EE has happily avoided some of the controversy surrounding renewable energy development in part because of the overwhelming case for EE as a least-cost resource. Portfolio elements at the margins of cost-effectiveness (or indeed that are only marginally cost effective using ambitious assumptions) can cloud the clear economic case for EE, to the detriment of the enterprise as a whole.

Alternative Approaches to Portfolio Management

The comprehensive approach to EE portfolio management is a long-standing popular one and one that has driven the development of some expansive program portfolios. What would other approaches to portfolio management look like? Here, this paper examines three potential high-level strategies to redesign portfolios based on alternate principles. The principles are then applied to portions of the Bonneville Power Administration portfolio to examine the results and implications.

Alternative 1: Target at a Program or Sector Level

Within the EE portfolio, costs often vary widely by specific programs and sectors. All sectors are included in a comprehensive approach, regardless of cost. This first approach to portfolio management examines the portfolio across all sectors to identify where the lowest cost savings reside, and if all of the available potential can be achieved at that cost. For example, if an initiative is currently being offered at a low cost, but there is little market uptake, that measure may be higher up the cost curve than originally anticipated. The portfolio is then redistributed based on the levelized cost and potential of each program. In redistributing the portfolio, the most expensive, lowest value sectors are greatly reduced or eliminated and efforts are refocused on the lowest cost opportunities.

Table 1 presents two approaches to distributing a reduction in the EE portfolio: 1) the reduction is distributed pro-rata based on existing targets and budgets; 2) the reduction is strategically taken from those sectors with the highest costs, thus redistributing the savings towards the lowest cost sectors or programs. There are of course many different redistribution scenarios that could be constructed based on managing different parameters, but the example here is to examine on shift from a portfolio built around comprehensiveness/distribution of customer benefits/equity to one built around lowest cost.

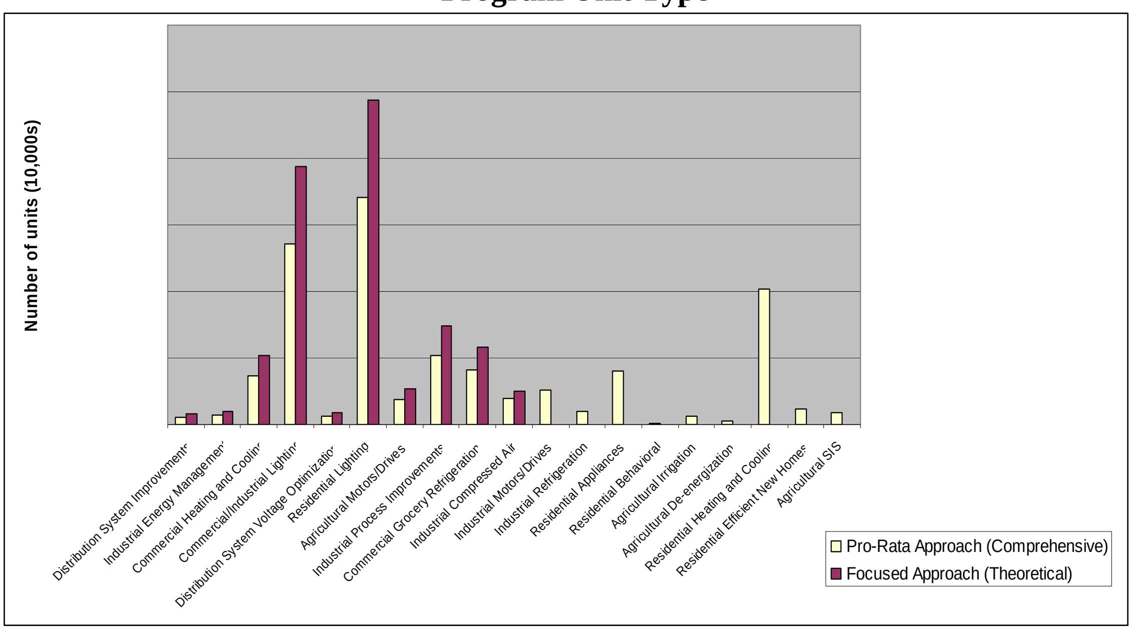
Table 1 provides BPAs planned portfolio initiatives and expected proportion of savings across all sectors, presented in lowest to highest cost rank given their levelized costs. The table presents the savings using a basis of 10,000 units for ease of presentation. The analysis included in Table 1 explores a hypothetical scenario in which program savings targets have been lowered by 30% and explores two approaches to this situation. The first approach is a 30% pro-rata reduction in the number of measures delivered in each category. This approach calculates an average cost of around $40/MWh.

In the second approach, categories are eliminated one by one, beginning with the highest cost measures, until an equivalent 30% reduction in savings is achieved. As shown in Table 1, the residential and agricultural sectors are the heaviest hit by this type of approach. In the residential sector, all programs except lighting are no longer offered. In the agricultural sector, only motors fall within the reduced cost range. The economic impact of this analysis is striking, resulting in nearly a 50% reduction in the average cost of the portfolio.

Table 1. Comprehensive and Focused Approach for the BPA EE Portfolio

Initiative Description	Levelized Cost per MWh	Cost Rank (1= lowest)	Current Program Units (Basis = 10000)	Pro-Rata Approach (Comprehensive)	Focused Approach (Theoretical)	Potential Savings
Program Weighted Average Levelized Cost per MWh:			$40.52	$40.52	$21.80	-46.2%
Total Program Units			10,000	7,000	7,000	
Distribution System Efficiency System Improvements	$11.04	1	80	56	80	
Industrial Energy Management	$14.91	2	97	68	97	
Commercial Heating and Cooling	$16.17	3	518	362	518	
Commercial/Industrial Lighting	$18.99	4	1935	1355	1935	
Distribution System Efficiency Voltage Optimization	$20.69	5	89	62	89	
Residential Lighting	$21.54	6	2437	1706	2437	
Agricultural Motors/Drives	$25.49	7	272	190	272	
Industrial Process/System Efficiency Improvements	$27.02	8	740	518	740	
Commercial Grocery Refrigeration	$28.39	9	584	409	584	
Industrial Compressed Air	$29.32	10	282	197	249	
Industrial Motors/Drives	$33.22	11	364	255	0	
Industrial Refrigeration	$34.00	12	136	95	0	
Residential Appliances	$44.00	13	571	400	0	
Residential Behavioral	$54.60	14	16	11	0	
Agricultural Irrigation	$71.55	15	91	64	0	
Agricultural De-energization	$78.38	16	37	26	0	
Residential Heating and Cooling	$95.00	17	1451	1016	0	
Residential Efficient Homes (New Homes)	$110.98	18	172	120	0	
Agricultural SIS	$329.16	19	130	91	0	

Figure 2. Pro-Rata (Comprehensive) and Targeted Approach by Program Unit Type



As discussed above, there are myriad reasons why such a radical restructuring of a portfolio could be ill advised. That said, the key conclusion here is that if you can undertake even some of the difficult decisions to build and operate your portfolio to maximize a specific parameter, the costs of capturing energy efficiency on behalf of ratepayers can be substantially reduced. While we have modeled such an approach around levelized cost per kWh in this example, a conceptually similar approach could be applied to more efficiently reduce demand, ease distribution difficulties, or meet other demand side objectives.

Alternative 2: Target at the Measure Level

Recognizing that there are significant benefits to engaging all sectors in EE, the second alternative examines an approach to target specific low-cost measures within a program or sector. This approach maintains a connection across the customer base, but is contrary to the currently popular goal of trying to maximize energy savings at each site touched. Instead, efforts are focused on achieving high market penetration of a single measure with low costs.

Like the portfolio-based Table 1, Table 2 presents two approaches to balancing the portfolio within BPA's commercial lighting program. Naturally, there is significant variation in levelized measure cost between categories, with costs between roughly $10 and $60 per MWh. In some instances this is consistent with expectations – CFLs (in the screw-in lamp category) and high-bay lighting are low cost, while demonstration technologies are more expensive. There are, however, some costs that seem counterintuitive. For example, high-performance T8s are high cost in this example due to a recent targeted effort to increase volume of this measure. This reflects a dynamic of simultaneous determination of price and volume that can complicate matters[1]. Assuming reduced program volume in this example lessens related concerns.

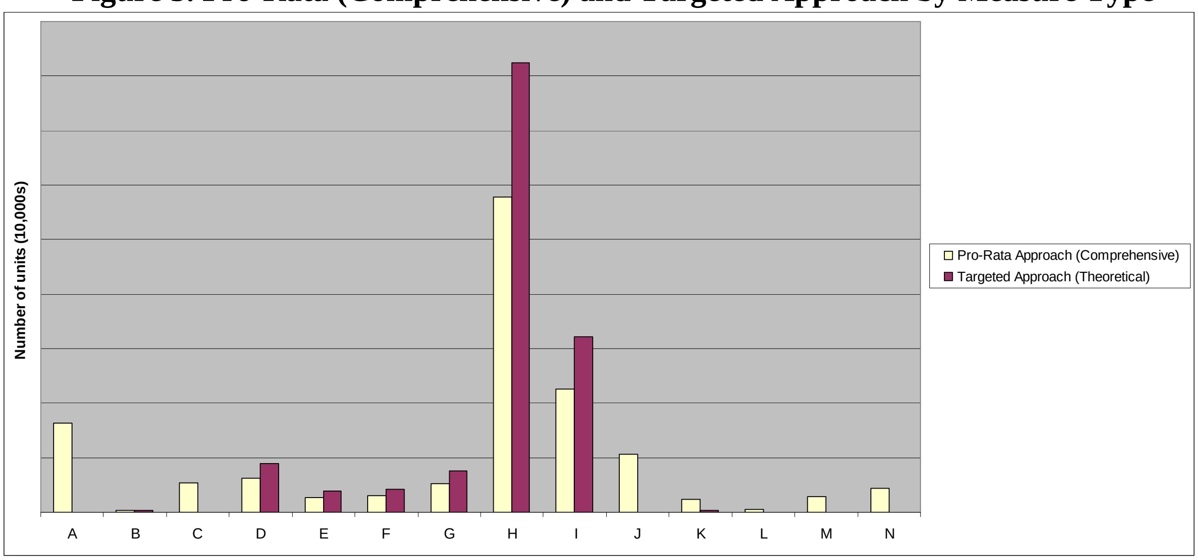
The pro-rata approach naturally leaves the levelized cost of the program unchanged at just under $19 per MWh. Like in Table 1, in the second approach (Table 2), categories are eliminated one by one, beginning with the highest cost measures. This results in the complete suspension of the HP T8 promotion (A), as well as the hardwired CFL category (C), but retains lower cost program elements at constant volumes. This approach results in levelized unit costs of $15.18 per mWh, almost 20% less expensive than the pro rata approach. Chart 2 shows the shifts in units of each measure type from the pro rata approach to the targeted approach.

[1] The challenge with simultaneous determination of price and volume, or throughput, of an efficiency program is that restructuring a portfolio assumes you can purchase additional savings from a program without increasing costs. This issue is rendered largely moot in our examples, which contrast portfolio design in a context of falling total portfolio size. Note also that the example may work in reverse – LEDs appear inexpensive in terms of the levelized incentive cost, but only account for 2% of program volume. It is likely that increasing volume would require higher costs, barring changes in the market.

Table 2. Comprehensive and Focused Program Designs in BPA's Commercial Lighting Portfolio

	Measure Description	Levelized Cost per mWh	Cost Rank (1 = lowest)	Current Program Units (Basis = 10000)	Program Units at 30% Lower Volume: Pro-Rata Approach (Comprehensive)	Program Units at 30% Lower Volume: Targeted Approach (Theoretical)	Potential Savings
	Program Weighted Average Levelized Cost per mWh:			$ 18.94	$ 18.94	$ 15.18	-19.9%
	Total Program Units:			10,000	7,000	7,000	
A	High-performance (HP) T8 or Normal Light-Output T5 Lamps and Ballasts	$ 36.49	12	1,164	815	0	
B	Standard T8 or T5 Lamp and Ballast	$ 19.46	7	21	14	21	
C	Hardwired Compact Fluorescent	$ 19.02	6	390	273	0	
D	Ceramic Metal Halide	$ 10.55	1	450	315	450	
E	Screw-in Lamps (includes CFLs)	$ 11.16	2	193	135	193	
F	LED	$ 15.05	4	212	148	212	
G	Induction	$ 16.94	5	378	264	378	
H	High-wattage Non-Fluorescents to High-output T5 or T8 HP fixtures	$ 13.61	3	4,124	2,887	4,124	
I	Metal Halide (Pulse-Start or Electronic only) and High Pressure Sodium (Limited Applications)	$ 20.48	8	1,608	1,126	1,608	
J	Occupancy Sensors, Timers, Photocells, and Control	$ 28.03	11	753	527	0	
K	T12 HO and/or VHO Lamps to T8 Lamps w/ Electronic Ballasts	$ 21.29	9	165	115	15	
L	High-output and Very High-output Fluorescents to T5 High-output Lamps & Ballasts	$ 60.79	13	33	23	0	
M	Other One-time Measure with Pre-approval from BPA	$ -		200	140	0	
N	Demonstration Technologies	$ 22.36	10	309	216	0	

Figure 3. Pro-Rata (Comprehensive) and Targeted Approach by Measure Type



Arguments abound for why the targeted approach may be unrealistic (and its savings unattainable). A program manager's ability to disaggregate comprehensive projects may be limited, and controlling relative volume in a posted-offer context is challenging. However, these challenges can be managed, particularly in the context of lowered targets that afford program manager the luxury to pick and choose projects. Further, 20% savings is potentially very significant at the scale of investment being pursued in certain programs.

Additional Alternative: Delay Adoption of Emerging Technologies

As EE targets and budgets have grown, and utilities strive to become known as market leaders, emerging technologies have become a focus of many programs, with an emphasis of getting the technology out there as soon as it is tested and proven. But, is this the right role for EE in the world of resource acquisition? An alternative tactical approach is to instead invest in increasing market penetration of proven technologies with reliable savings, delaying exploration of and adoption of more costly, less certain emerging technologies. In a context of lowered targets similar to those modeled above, real cost savings could accrue to the program that can defer embrace of emerging technologies until quality improves and costs decrease. This approach implicitly leaves the development and proving out of emerging technologies in the hands of the private sector, government, market transformation organizations such as the Northwest Energy Efficiency Alliance, or other utilities, and in that sense entails an element of free ridership. This approach assumes that development and demonstration of energy savings will occur through market forces without utility influence (or at least without influence from every utility), which may be a significant and unrealistic assumption. However, within the context of portfolio management, the question is considered of when investments should be made in emerging technologies.

Discussion

After examining the potential impacts of alternative approaches to portfolio management, the questions still remain – what are the implications of a more focused approach to EE portfolio management? How does the industry find a balance between the alternative approaches and the comprehensive approach? The discussion here suggests answers to some of these questions and proposes ways to consider whether an alternative to the comprehensive approach is a good idea for an organization.

First and foremost, the alternative approaches to portfolio management would work best in a resource-constrained environment. When budgets are limitless, savings targets astronomical and support is strong, a comprehensive approach is warranted, with the usual restrictions on cost-effectiveness. However, in a time of limited financial or staff resources, where doing everything is inherently impossible, the alternative approaches presented hold the promise of creating a portfolio that more effectively balances financial resources and acquisition of energy savings.

Implications of Focused Portfolio Design

The focused approach to portfolio design certainly possesses benefits in the cost-efficiency of resource acquisition. In the examples of the BPA portfolio, the average cost across the portfolio is reduced in all cases when the alternative approach is applied. In a world of limited financial resources and ambitious targets, this ultimately provides a higher chance of achieving the target and meeting resource acquisition goals. If the ultimate goal of the EE organization is to achieve least-cost resource acquisition, the alternative approach to planning sets up the organization for success. This approach to portfolio management would make more sense in a very budget-constrained world in which the achievement of additional energy efficiency resources is very limited by available budget and financial resources of the utility.

However, there is certainly some significant loss to the customer service function of EE in adopting a focused approach to portfolio management. The trade off here is that, ultimately, the utility purchases a more cost-effective resource from its customers, thereby helping to minimize future rate increases. Because implementing measures and acquiring energy savings necessitates customer interaction, a combination of customer service and resource acquisition may be most suitable. This perspective would demand a portfolio design that addresses all sectors, but prioritizes measures with the best opportunity within those sectors. Opportunities may be left on the table with such a measure-specific approach. However, those measures are arguably not kilowatt hours that a utility is interested in purchasing at this point, given its resources and efficiency targets.

Many program models within the comprehensive approach suggest that loss leaders are important in gaining uptake –you need to offer broad programs to get people to participate, or offer “gateway” measures that give the customer what they think they want, such as new windows, in order to get them to consider higher value measures like a new heat pump. The alternative approaches promote strong economics over strong relationships. In the theoretical world, the customer installs the heat pump because the value of the savings has been demonstrated beyond a doubt. This paper does not answer the question of whether this comprehensive approach is worth the resources put into it – to some extent relationships and economic fundamentals are substitutes in program implementation — but does suggest that further research on the true costs and benefits of these approaches would better inform future EE portfolio management.

Delaying the support and integration of emerging technology also may reduce portfolio costs. On the down side, reducing support for emerging technology provides a smaller pipeline of future energy efficiency opportunities for programs. However, the delayed introduction of emerging technology reduces the risk of investing in technologies that do not prove to reliably deliver the promised savings, thus increasing the certainty of EE as a resource. Delaying adoption of new technologies forces these measures to move farther to the left on the supply curve before integration into the portfolio.

Balancing Portfolio Management

The balance between a comprehensive approach and a more targeted portfolio design necessitates balancing the realities of energy efficiency as a resource to be purchased at the absolute lowest end of the supply curve and energy efficiency as a customer service that must be heavily marketed and sold as such. If utilities are indeed looking for the least-cost resource, utilities should design and implement their programs in more focused ways that balance a focus on lowest cost with the requisite marketing of energy efficiency to customers. The focus should be on implementing the least cost programs until the market is transformed while also incubating the most promising technologies for future inclusion in programs in a very targeted way. On the other hand, if customer service objectives are explicitly a co-benefit of energy efficiency efforts, utilities should be focused on developing a comprehensive approach that is something to everyone.

At the heart of this are questions of what “best practice” in program design and implementation is. Is it saving the most energy at a site? Energy managers may be interested in this target, but that arguably leads to overinvestment from a utility perspective. Saving more energy on the grid is a more laudable goal, however that might mean not doing the things that save the most site energy and instead focusing on system-wide value. If instead of thinking about program design as maximizing a single touch with a customer, we think about program design as how to save the most in aggregate, we may be led to a design that focuses on a more targeted and less comprehensive approach.

The appropriate level of focus for a portfolio will depend on the circumstance-specific objectives of a portfolio and relevant resource constraints. However, the theoretical examples above demonstrate that, in any portfolio design, attention should be paid to the right balance of a comprehensive approach and a least-cost-focused approach, given the potential cost savings of the latter.

Conclusion

This paper has examined a theoretical rebalancing of an energy efficiency portfolio based on a simple implementation of strict economic principles of achieving the least-cost resource within a limited acquisition budget. The results of this theoretical exercise are striking, with a sharply targeted approach delivering unit cost savings on the order of 50% or more under some circumstances[2]. Of course, the realities of implementing energy efficiency programs endure, and rote implementation of the targeted approaches is not recommended. As discussed earlier in the paper, there are many important benefits to a more comprehensive approach to portfolio management, including customer service, rate payer equity, and diversification. There is also the question of whether customers would be convinced to participate in a very focused program that did not provide the comprehensive treatment they may expect – in short, it may be impossible to capture all of this theoretical cost savings given the market realities of program implementation.

In the end, the benefits of the comprehensive approach likely still recommend it as a core approach to portfolio management. However, this paper has demonstrated that the costs of delivering various non-energy co-benefits of energy efficiency programs are real and substantially larger than commonly assumed. It then follows that program design should duly weigh the cost savings potentially available from adopting some elements of the focused approach against the benefits of a more comprehensive approach. The sweet spot of EE portfolio management should lie in finding the balance between embracing a comprehensive portfolio that satisfies customers and captures the risk mitigation benefits of diversification while also leveraging elements of the least-cost focused portfolio that maximizes achievements at the low end of the energy efficiency supply curve.

[2] If this rebalancing were pursued both between and within programs, the percentage savings presented in alternatives 1 and 2 (of 46% and 20% respectively) would compound to some extent, producing savings potentially over 50% without adoption of the third approach by deferring embrace of emerging technologies.

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