Power System Engineering, Inc.

# Peak Time Rebate Programs:

## Reducing Costs While Engaging Customers

By Power System Engineering, Inc. (PSE)

PTR programs reward customers who reduce electricity consumption during peak times.

## Introduction

Peak time rebate (PTR) programs reward customers who reduce electricity consumption during periods of high-cost electricity (peak times) with monetary rebates. Those who do not reduce usage during peak events are simply charged the normal rate.

For this reason, PTR programs typically see much higher participation rates than many other demand response programs. In addition, PTR programs generally have high customer satisfaction ratings. And on the utility side, PTR programs do not require any changes in rate design. Assuming PTR rebate levels are set correctly, PTR programs can benefit both customers and utilities, resulting in a win-win outcome.

PTR programs typically have very low upfront costs. Although they do require AMI interval reads for the participants, if AMI is already in place, upfront costs are minimal. Costs to the utility are mainly incurred in the form of rebates to the customers in exchange for demand reductions; therefore, ongoing costs will be a function of how many peak events are called each year. If the utility's event call strategy is managed properly, ongoing costs should be lower than the savings attributable to the peak reduction.

## Rebates: What is the Utility Paying for?

Utilities can incur power supply, transmission, or distribution costs driven by peak demand levels. A distribution utility may incur monthly or annual demand charges from its power supplier. A power supplier may incur costs of procuring extra capacity to meet its capacity requirements. By lowering peak demands, these utilities can reduce overall costs.

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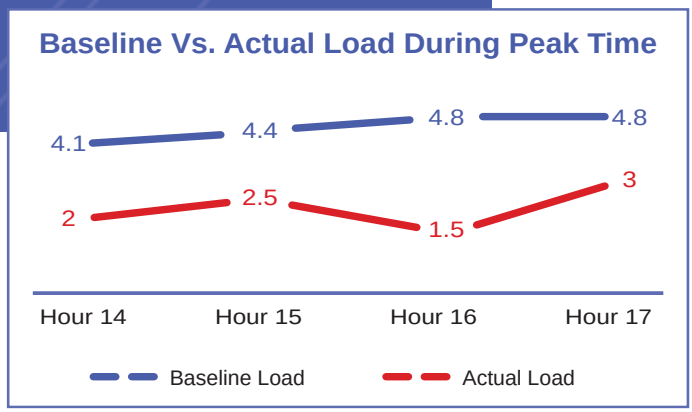
The rebate is calculated based on the sum of the kilowatt hours reduced, multiplied by the rebate rate (in $/kWh).

## How are the Rebates Calculated?

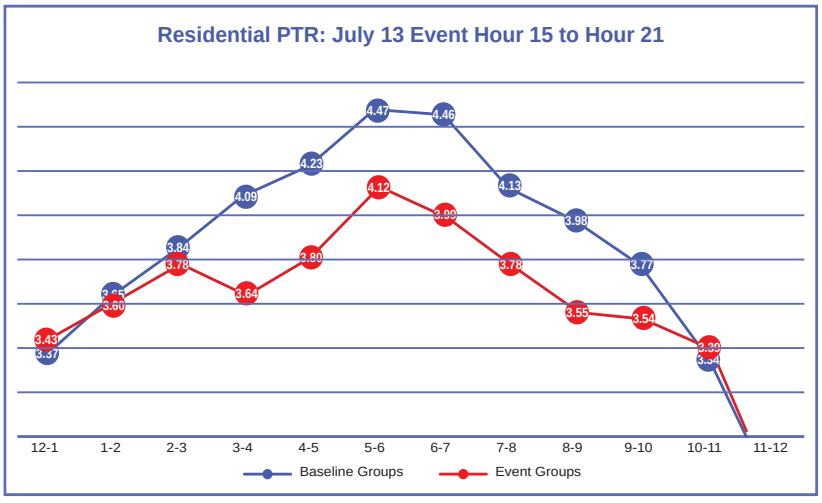
The utility is paying the participant for the reduced kilowatt hours during a called peak event. In the graph below, the expected or "baseline" load is a projection of how much electricity the participant was likely to use if there was no peak event. This amount is shown by the top line. The actual metered load is shown by the red line. The amount reduced by the participant is the difference between the two lines. The rebate is calculated based on the sum of the kilowatt hours reduced, multiplied by the rebate rate (in $/kWh).




The baseline calculation is key in determining rebate amounts. In our experience, simple calculation methods often fail to accurately determine the baseline usage. When baselines are inaccurate, some participants who actively reduce loads are not compensated for their efforts. This can undermine the PTR program. A regression analysis that factors in variables such as time of day, day of week, and weather conditions is usually far more successful in providing accurate baselines. More accurate baselines result in proper rebate amounts, which helps ensure the success of the program.

## Program Impacts and Participation Rates

Program impacts will vary based on a number of factors. We have estimated average kW impacts for residential customers between 0.2 kW to 0.5 kW per hour per PTR participant. However, many variables can affect impacts, such as rebate amounts, notification times and methods, and the frequency of called events. Commercial, industrial, or irrigation participant impacts will vary based on the specifics of the consumers on the system.




*The graph illustrates one event day (July 13, 2015) where an event began at 3:00 p.m. and concluded at 9:00 p.m. The pilot was constructed with control groups, so that some participants were not notified of the event (baseline group), and other participants were notified (event group). The top line represents the average load shape of the baseline group, and the red line shows the load shapes of the event group. There is a pronounced difference during the event hours between the two groups, with the gap being maintained throughout the six hour event.*

It has been our experience for residential PTR programs that almost all of the total program impacts come from the top half of participants (based on kWh of reduction). There are certain consumers who may even "throw the breaker" during peak events.

Participation rates depend on marketing strategies, rebate amounts, and how long the program has been available. In the first year, we tend to see participation rates of around twenty to thirty percent of residential consumers who are contacted. The participation rates tends to increase over time as word of mouth and subsequent program marketing increases consumer participation.

The program's costs are mostly incurred as peak events are called, so it is imperative to develop a sound event call strategy.

## Business Case:
## The Importance of Properly Calling Events

Business cases will obviously vary based on the specifics of each system and will be dependent on the benefits of reducing peak demands. PTR rebate levels can also be calibrated to the benefit savings. Because a PTR program's costs are mostly incurred as peak events are called, it is imperative to develop a sound and efficient event call strategy.

The expected benefits of calling an event are calculated as the probability the event hour will set a peak, multiplied by the benefits to the utility if the peak hour is reduced.

**Expected Benefits = Probability of Peak x Benefits of Reducing Peak**

- **Events should be called when the expected benefits of calling the event exceed the cost of the event.**

**Expected Benefits > Cost of Calling Event**

- **Since costs are incurred as events are called, PTR rebate amounts and call strategies can typically be tailored to bring economic value based on the specific situation of the utility.**

A PTR program can be a good beginning step to a demand response portfolio or a strong complement to an existing one.

## Next Steps

The most immediate obstacle is whether your utility has the ability to pull and store interval data reads for individual consumers. If your utility has this ability and also incurs capacity costs in one fashion or another, it is possible that a PTR program would add economic value while enhancing customer engagement and satisfaction.

### 1. Create a Business Case

If your utility is a good candidate for a PTR program, the next step is typically to create a business case. If your utility has an existing demand response portfolio, the business case may include an understanding of how to best optimize that portfolio and how PTR may fit into that. If your utility is currently employing layering strategies or dynamically calling events with different groups, a PTR program can be a valuable tool in that process. If your utility is just getting started with demand response, the ideal direction may be to first understand if demand response makes sense for you and, if so, define how to optimally deploy programs to maximize value.

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Running a pilot before full deployment is recommended to work out bugs.

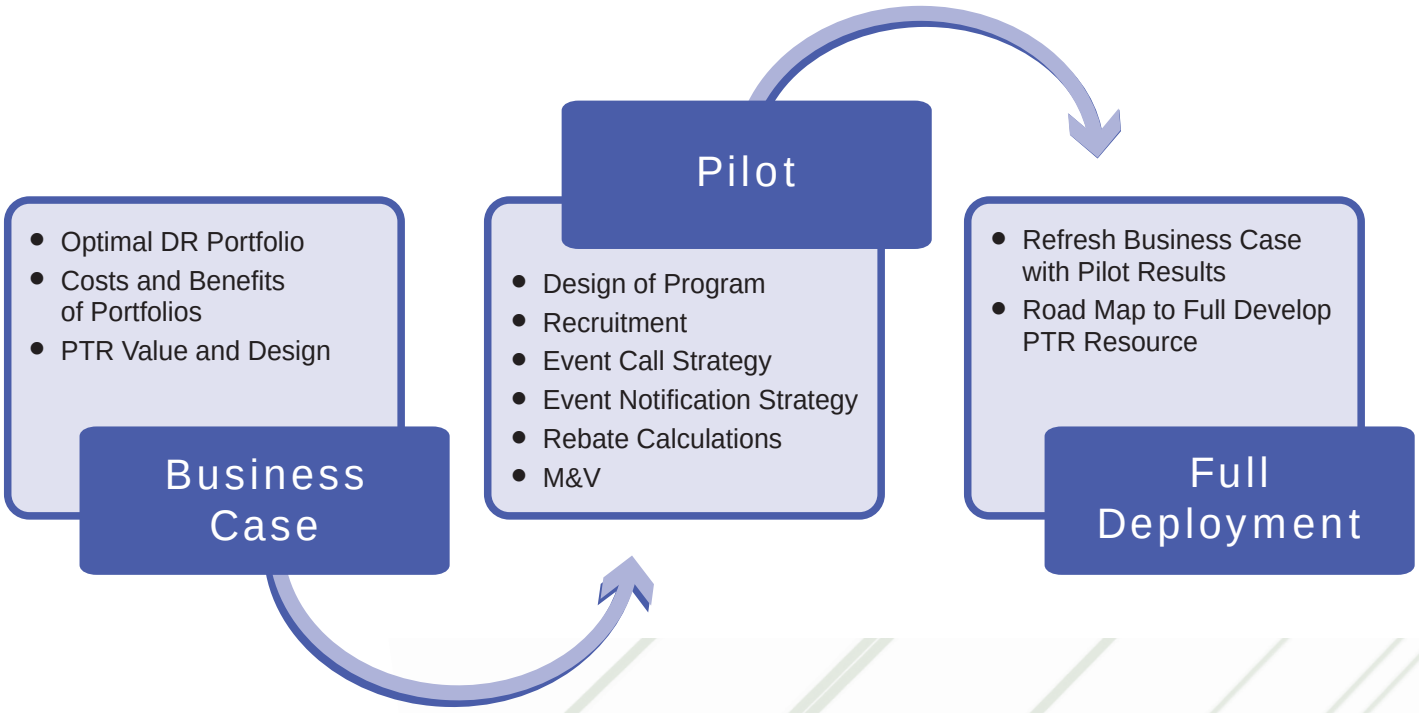
## 2. Run a Pilot Program

If the PTR business case is favorable, the next step is to roll out a PTR pilot. Pilots are recommended to work out the bugs, such as making sure the interval data is handled properly, rebate checks are sent, questions are fielded properly, events are called optimally, and event notifications are sent in a timely fashion. If an unforeseen problem occurs, it is far easier to sort out manually with only 100 participants as opposed to a fully deployed program with many times that. Because there are no upfront investments that typically need to be made, PTR pilots can be put into place fairly quickly.

After the pilot, utilities should conduct measurement and verification (M&V). This examines the demand impacts of the program and other variables that you may want tested (e.g., the impacts of notifying customers the morning of vs. the day before, the effect of different temperatures on reduction impacts). A post-pilot survey can also be a useful tool in assessing rebate levels, reasons for reacting (or not reacting), notification times and methods, and receiving other suggestions on improving the program.

## 3. Create a Full Deployment Roadmap

A full deployment "go/no-go" decision can then be made using a refreshed business case that inserts the M&V and post-pilot survey information. This solidifies the original assumptions with real-world data for your system. A full deployment roadmap can be created using the lessons learned from the pilot recruitment, marketing, and event calls. As with the pilot, given there are no upfront investments that typically need to be made, full PTR deployments can be put into place fairly quickly.



## Conclusion

A continual process of evaluation and improvement is helpful for PTR programs. This includes assessing the communication methods of the program, rebate levels, and finding further engagement opportunities with the participants. For example, one utility PSE works with is considering offering different rebate tiers for individual participants based on their past participation and performance in the PTR program.

PSE can be a partner with you in any stage of the PTR program process. For some clients who wanted to completely outsource the PTR program, we have provided turnkey program services. For other clients, we have provided help with specific tasks, such as calculating the rebates or setting up the business case.

## About the Author

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***Leader – Economics and Market Research***

Steve received a BS in Economics and MS in Agricultural and Applied Economics from the University of Wisconsin-Madison. Steve has been a consultant in the energy utility industry for fifteen years. He is an expert in utility performance benchmarking, incentive regulation, value-based reliability planning, productivity analysis, and DSM. Steve has provided senior-level consulting services, presented findings, and conducted expert witness testimony for locally-owned utilities, IOUs, regulatory commissions, trade associations, and consumer advocates. He has published a number of peer-reviewed journal articles on these and other topics.

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