Utility Pump Efficiency Program Frequently Asked Questions

Background

There is an emerging opportunity for utilities and energy efficiency organizations to reduce the energy consumption from pumping systems using rebate-based program models similar to those used in lighting or HVAC equipment. Recent efforts to test and label clean water pumps in order to communicate product efficiency allows utilities to easily provide rebates for purchases of equipment above the current practice baseline[1] and acquire reliable energy savings. A handful of such programs exist in the United States and have been pioneering techniques to promote efficient products in the pump market, which has not often interacted with utility programs.

The Hydraulic Institute asked an experienced pumps program implementer and technical expert to share their experience for the benefit of utilities starting new pump rebate programs. This memo summarizes their findings in the format of Frequently Asked Questions.

Frequently Asked Questions

1) **Why have pumps historically been left out of utility energy efficiency programs?**
   Pumps have traditionally been reached by utility custom projects that require an engineer to calculate the energy savings potential at a single industrial site. Because of the time and expense associated with this process, custom projects tend to address retrofits of large industrial pumping systems, not the replacement or specification of the smaller pumps that are ubiquitous in the built environment. The Hydraulic Institute worked with the Department of Energy (DOE) to institute an efficiency requirement, standardize pump testing, label products with energy efficiency ratings, and characterize the pump market to help understand the baseline. Based on these new data, we can now accurately and reliably characterize the likely energy savings from an average pump at the point of sale, similar to other deemed measures. All of a sudden, utility rebate programs are easy!

2) **What is the energy savings potential?**

[1] "Current Practice Baseline" refers to the weighted average efficiency of all pumps sold within a certain market or region.

DOE estimated that pump manufacturers will ship nearly half a million pump shipments in the U.S. in 2020.[2] While the volume of those shipments will vary between regions and the savings potential depends on the sizes of those pumps, in all they represent over 180 TWh of energy savings over their service life, assuming all pumps are installed with the maximum achievable technology. This is a huge opportunity not to be missed by utility efficiency programs.[3]

3) **How has the program attempted to promote efficient pumps?**
Our team is implementing a midstream program in the Northwest, meaning we partner with pump distributors to promote more efficient pumping products. It's a long game; we rely on those distributors to influence the market through their relationships with their customers. Our program provides incentives for efficient pumps, but also bonuses for achieving larger scale goals like increasing the average fleet-wide Energy Rating of the pumps they sell over time or increasing their sales of smart pumps.[4] The program also provides funding that distributors can use to educate customers, develop marketing, or motivate sales teams to reach sales goals of the most efficient products.

4) **What is the most important recommendation for utilities pursuing this strategy?**
Invest in relationships with your distributor partners. This is vital no matter how a program approaches the market. A large portion of pumps enter the market through distributors, and this group has the opportunity to influence specifying engineers or support contractors with technical assistance for installation and commissioning of new, potentially unfamiliar products like smart pumps.

5) **What other strategies exist in addition to midstream approaches?**

Other utility efficiency programs have found success directing their program efforts and incentives downstream, directly to the pump purchaser or eventual owner. Program implementers are often more familiar and comfortable with this strategy, which targets messaging and rebates directly to the decision-maker. However, this is a big group, and it requires great effort to reach each one of those transactions.

6) **What exactly are smart pumps?**
Smart pumps are pumps with a motor and a variable frequency drive (VFD) connected into a single unit. It is common for pumps to be outfitted with a drive in the field, but that requires a separate contractor running cables from the VFD on the wall to the pump, which is frequently in the middle of the floor. Furthermore, the VFD is not tuned to the

[2] DOE National Impact Assessment. https://www.regulations.gov/document?D=EERE-2011-BT-STD-0031-0058.
[3] Hydraulic Institute provides a model TRM deemed measure list, which also provides DOE's estimate of national shipments. Interested parties can use these resources to estimate the technical potential of energy savings within their market.
[4] Smart pumps have an integrated pump, motor, and drive are in a single product. The drive is programed to optimize the specific pump based on the pump efficiency curve, and can reduce installation costs compared to separate pump and drive products.

specific pump curve of the pump it is installed with, and may not be set to fully optimizes performance of the pump at the point of commissioning and balancing, or over time as system requirements change. A smart pump is calibrated for the specific pump curve and comes as a single piece, meaning installation may be simpler and the pump may be more efficient. Smart pumps also make balancing easy and can better and automatically adapt to changing system requirements in the future.

7) **How does the program structure pump incentives?**

Generally, the program scales incentives by the Energy Rating (ER) of a pump and the motor input horsepower. ER is a convenient rating that, generally speaking, correlates to a percentage increase in efficiency over the current practice baseline pump. Structuring an incentive to be linear with ER means the program can easily provide greater incentives for greater energy savings. The incentive also scales up by size, represented as motor input horsepower, because the pump's cost and energy savings scale by input power.

More consideration needs to be given to pumps sold with a VFD. Many state codes follow the International Code Convention's International Energy Conservation Code, which requires pumps greater that 7.5 HP installed into new buildings or major remodels to have a drive as well. Efficient pumps that are installed in projects where code requires a drive will have a much higher baseline than a constant load pump. However, pump and drive combinations installed in retrofit projects have a lower baseline that reflects the typical mix of pumps and VFD penetration where a drive is not required by code. These projects have the largest potential energy savings. Incentive programs should be sure to structure incentives to reflect the increased savings for these retrofit projects.[5]

[5] For more detail on structuring incentives, refer to HI's Utility Program Design Memo and Deemed Measure Workbook. http://www.pumps.org/EnergyEfficiency.aspx