

# ILLUME

## Overview of Energy Savings “Kit” Programs: Background, Challenges, and Opportunities

White Paper

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**Contact Name:**

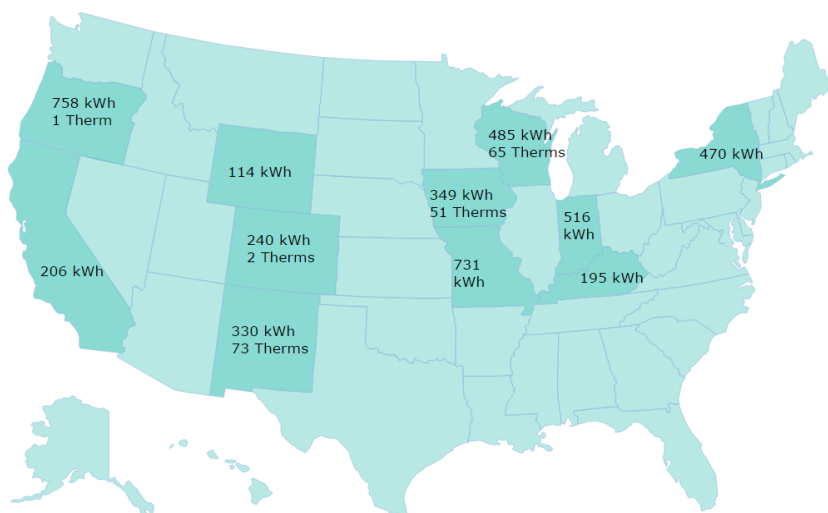
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## EXECUTIVE SUMMARY

Energy “kit” programs were first introduced in the 1990’s, and have continued to evolve over the past few decades as new markets develop and as existing markets mature. Today energy kits are often integral key part of many energy efficiency portfolios, allowing utilities to both meet increasing energy savings goals and the needs of various types of program offerings. Energy kits have a level of flexibility and functionality that allow them to serve as a gateway, or introduction, to energy efficiency to prime the customer for additional program offerings in the future, or within existing programs to engage customers and boost program energy savings and cost-effectiveness.

Kit programs continue to offer utilities a consistent source of energy savings across the country. Typical kit program contents (CFLs, high efficiency showerheads and faucet aerators) have been thoroughly vetted by the energy efficiency industry through third party evaluations and technical resource manuals, and offer a reliable source of energy savings when installed. The figure below shows per kit savings values in 11 different jurisdictions. Energy savings values can vary greatly depending on the kit contents, delivery methods, and other factors. Importantly, achieving high installation rates is integral to meeting kit energy savings goals.

Figure 1: Energy Savings per Kit



The delivery type employed and the implementation of the program can greatly affect per home savings values. A review of 12 third party evaluations identified key kit program attributes to maximize energy savings potential. To maximize savings, kit programs should consider thorough upfront and ongoing

training for staff performing direct installs, educational media of various types to engage customers and increase the likelihood of installation, alternative outreach efforts such as partnering with community organizations and a neighborhood “blitz” approach, leveraging kits to deepen savings in behavioral programs and integrating quality assurance efforts and tools into program design, such as hand-held tablets to record installations and post-participation surveys.

Opportunities still exist in the energy efficiency space to effectively use kits to increase energy savings and customer satisfaction. Identified opportunities include the following:

- \* **New Markets.** Kits can be used as a way to reach out to customers in new markets to increase utility program awareness and promote other programs.
- \* **Customer Segmentation.** Programs can target specific hard-to-reach customer segments like multi-family customers or rural areas to affect energy savings where program participation rates are traditionally lower.
- \* **Behavioral Program Engagement.** Kits can be used to engage customers in behavioral programs to “opt-in” to additional program platforms.
- \* **New Technologies.** Newer technologies can be included in kits (in addition to typical kit measures, like CFLs) to increase penetration rates and explore customer reactions and usage.
- \* **Competitive Energy Markets.** Kits can be provided as a way to gain or maintain customer satisfaction in competitive energy markets.

As new and existing energy efficiency markets develop, energy kits offer a viable means of establishing and deepening connections with the customer and providing verified energy savings along the way.

## A. PAST AND PRESENT OF ENERGY “KIT” PROGRAMS IN THE U.S. MARKET

### HISTORY OF KIT PROGRAMS

Energy “kit” programs were first offered by utilities in the 1990’s. These kits were primarily a customer service offering, and allowed utilities a way to both reach out to their ratepayer base and create or maintain good relations, and also to provide energy saving measures for customers’ homes. Early kit programs were often mailed to customers who signed up voluntarily or as part of a new customer welcome packet.

Similar to today, standard kit measures often included compact fluorescent light bulbs (CFLs), high efficiency showerheads and faucet aerators. However, during the 1990’s technical specifications and measure quality were still developing for all three of these measures. For CFLs, several factors dissuaded consumers and limited market adoption, including low light output, inconsistent performance, along with bulky size and inability to fit in many light sockets.<sup>1</sup> Low-flow showerheads and faucet aerators also faced difficulties in consumer adoption early on. Lower water usage (gallons-per-minute or GPM) by these devices was mandated by the federal government in the 1990’s. While water usage was reduced from about five to seven GPM to 2.5 GPM, early models experienced a reduction in water pressure as well. This often resulted in having to take longer showers or hot water draws to clean away soap or shampoo, reducing the actual energy savings achieved and ending in a less-than-satisfied customer experience.

Poor measure performance in early kit measures led to low customer satisfaction and a call to the industry to invest in quality control and assurance measures. One of the outcomes of this call for quality control was the ENERGY STAR® program which expanded into the residential lighting market in 1997<sup>2</sup>, labeling lighting that was at least 75% more efficient than a standard incandescent bulb and setting technical specifications around lighting quality and performance. In 2006, the WaterSense® program was also introduced, creating an added checkpoint on product quality and control related to devices that save water as well as energy, such as high efficiency showerheads and faucet aerators.

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<sup>1</sup> Department of Energy: [<http://energy.gov/articles/history-light-bulb>].

<sup>2</sup> ENERGY STAR®, “Celebrating 20 Years of ENERGY STAR”, [[http://www.energystar.gov/index.cfm?c=about.20\\_years](http://www.energystar.gov/index.cfm?c=about.20_years)].

## KIT PROGRAMS TODAY

Since the 1990's, the hurdles that plagued many of the early kit measures have been largely overcome. Specifically, CFLs have improved significantly in performance and light quality, have come down in price, and are offered in a variety of wattages and bulb types. The introduction and rapid advancement of LED bulbs have offered additional options in markets where CFLs are more highly saturated or specifications require alternatives like the LED. High efficiency showerheads and faucet aerators have also increased in performance and quality by both decreasing water and energy consumption while stabilizing water pressure. Kit programs have expanded both in the program designs and the types of measures offered as a way to meet the ever-growing savings goals and objectives of utility program portfolios.

Today kit programs serve two primary purposes in an energy efficiency portfolio. First, they can serve as a "gateway" to energy efficiency and participation in other programs. For customers who are not as familiar with how to save energy in their home or cannot afford higher cost measures, the kit offers a user-friendly and no-cost or low-cost introduction to energy efficiency. This broad approach casts a wide net across the customer market, allowing program administrators to reach a large number of households at once with energy savings benefits. Once this connection is established with the customer and an understanding of the benefits of energy efficiency are experienced, additional opportunities to save energy in the home can be identified and promoted, hopefully leading to program participation in other programs that aim to achieve deeper energy savings in the home.

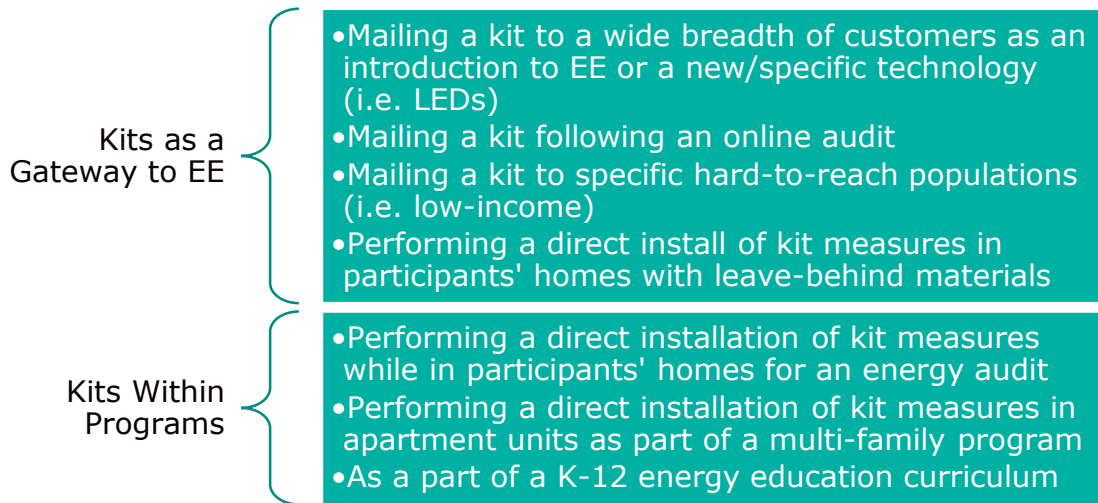
Second, kits can also serve as an add-on to existing programs and/or an integral piece of a sector-based program. Some examples of this include the following:

- Mailing a kit after completing an online audit
- Delivering kits through energy education programs in K-12 grade schools paired with curriculum on energy and water conservation
- Direct installing kit measures during an in-home energy evaluation or walk-through audit of a multi-family property

Especially for energy audit programs where the customer may or may not follow-through with the program recommendations, offering kit measures at the time of the audit or just following it can result in delivering energy savings where savings may not have accrued otherwise. This can increase overall program energy savings and the cost-effectiveness of existing programs by allowing for greater savings to offset the cost of scheduling and auditor travel time.

The figure below lists examples of different kit-type programs.

Figure 2: Examples of Kit Programs



## KEY EVALUATION RESULTS AND TAKEAWAYS

### EVALUATIONS REVIEWED AND KEY FINDINGS

Given the level of utility investment in kit based programs, ILLUME wanted to undertake a review that looked at whether or not these models were successful in supporting overall utility portfolio savings. In order to examine this we reviewed 12 evaluations of energy kit programs from 11 different jurisdictions across the U.S., covering a variety of program designs, including mass mailings of kits (4), direct installation of kit measures (2), kits as a part of a survey (online, mail or phone) or personalized energy report (3), home energy audit (5), K-12 education program (2), low income education (1) and kits as rewards for program participation (1).<sup>3</sup>

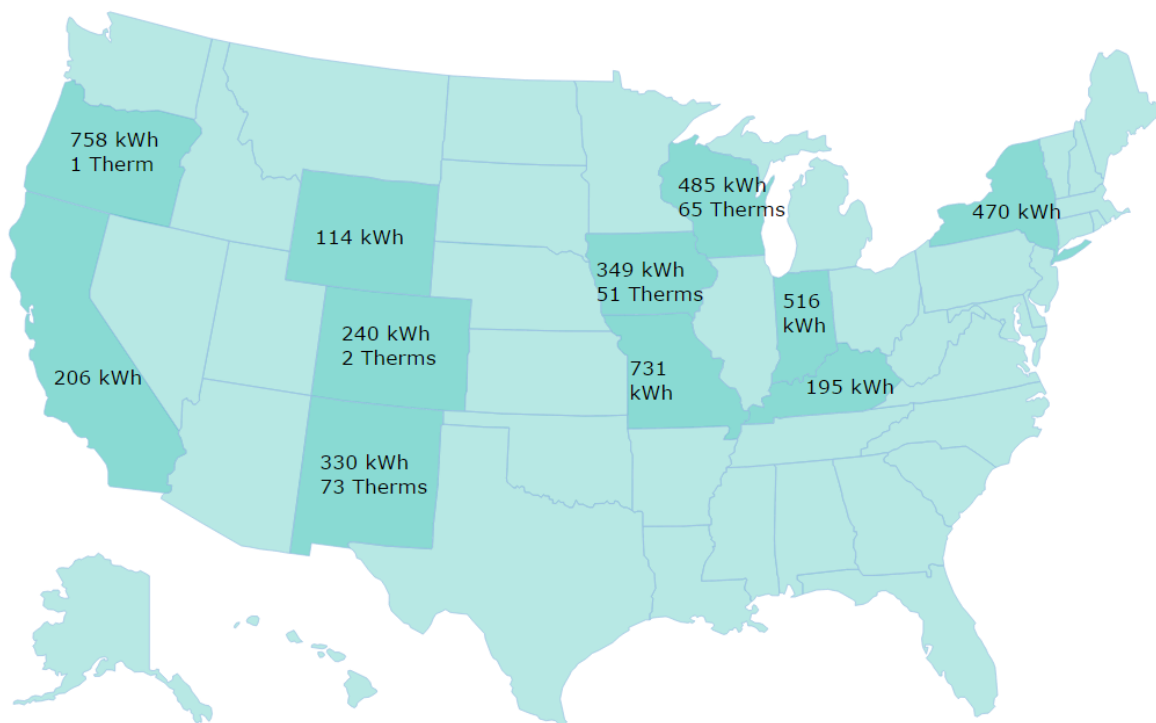
Through this review we set out to understand what level of savings these programs are achieving, and the factors that affect program and per home savings values, such as installation rates, the number and type of measures offered, delivery types, among others. The following sub-sections explore these areas.

<sup>3</sup> A list of the evaluations reviewed and sources are included in Appendix A.

## Energy Savings

During our review we documented kit program energy savings values when available. The figure below shows per kit savings values from 11 different kit programs across the country. As shown, there is wide variation in the level of savings per kit. Savings values per kit range from 114 kWh to 758 kWh for electricity savings and 2 to 73 therms for natural gas savings.

Figure 3: Per Home Savings from Kit Programs\*



\* A list of the evaluations reviewed and sources are included in Appendix A.

The level of savings per kit can vary for several different reasons. First, the savings values identified vary based on the source and type of evaluation performed. Some savings represent ex ante values (like New York and Indiana), while others represent net values (like Wisconsin and California). The evaluation method used can also vary, for example customer surveys were used in Indiana, while a billing analysis was conducted in Kentucky.

Below we discuss other key factors that may affect per kit energy savings values. As kit programs are planned and implemented, close consideration must be given to these areas.

### *Delivery Method and Implementation*

The delivery type employed and the implementation of the program can greatly affect per home savings values.

If the kits are direct installed, program representatives have the opportunity to identify areas in the home where there are energy savings opportunities, such as installing in high use fixtures (typically living room, kitchen) and not installing them in basements and closets and work with the customer to install measures where they are needed and most likely to remain installed and used. The number of kit measures can easily be scaled up based on the number of viable savings opportunities, as resources allow. Kits that are mailed or installed by the customer do not have this luxury, and therefore program administrators must exercise caution in providing too many measures per kit, balancing the possibility that not all measures may get installed. An evaluation from the Energy Trust of Oregon noted that kit contents should be altered based on installation rates and free-ridership values found through customer surveys, including those measures with the “greatest likelihood of producing savings.”

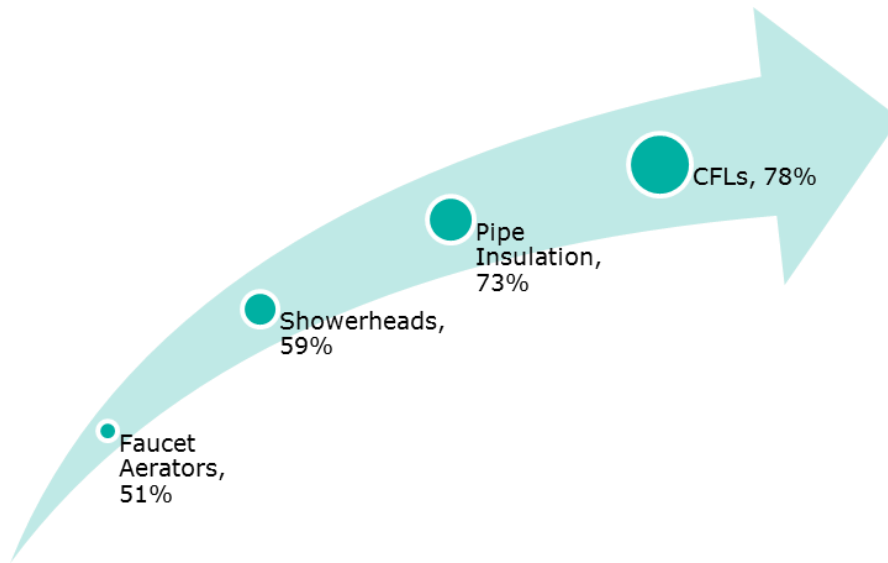
However, employing a direct install type program is not a guarantee to ensure energy savings. For either delivery method, special attention must be paid to the deployment of the kits in the field, in addition to quality assurance measures. Characteristics of successful kit programs are discussed further in sections below.

### *Installation Rates*

Achieving high measure installation rates are integral to maximizing per home energy savings values. The figure below shows average installation rates for the most commonly included kit measures.



Figure 4: Average Installation Rates



\*Average installation rates were calculated by averaging the installation rates across the reviewed evaluations.

The averages above include installation rates for both direct install and customer-installed kit programs. It is important to note that 100% installation rates cannot always be assumed for direct install programs, as the customer may uninstall the measure after-the-fact or put additional measures into storage. Installation rates can also vary based on the practices of program representatives, as we found in our review of program evaluations. Maintaining a high level of installation and a persistence of installation is critical to the success of these program models.

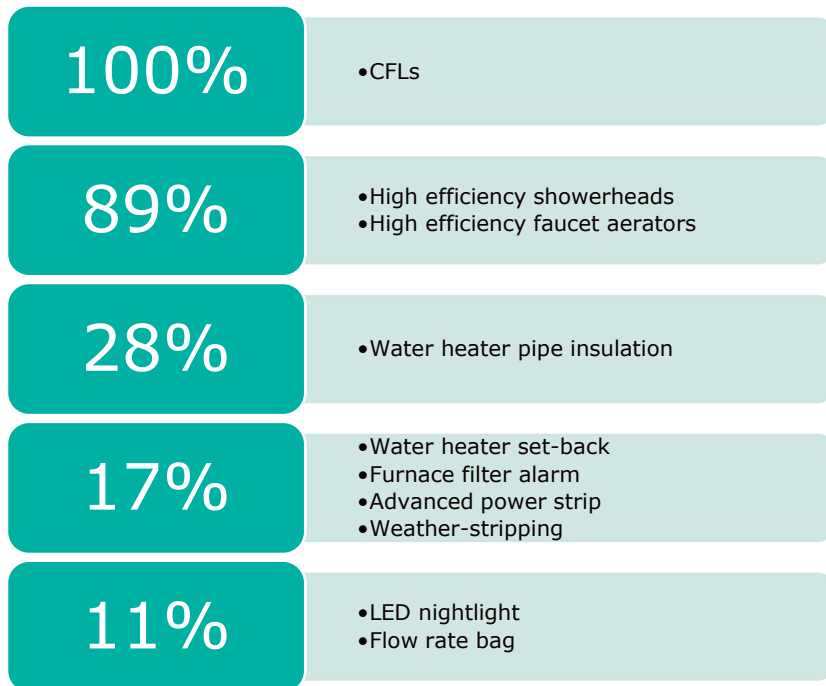
### *Types of Measures in Kit*

Our review found that kits may be comprised of a variety of different measures, though a primary base of measures (CFLs, faucet aerators, and showerheads) is almost always included. These “tried and true” measures have been vetted thoroughly by the energy efficiency industry and when installed offer consistent energy savings.

Other kit measures offered include water heater pipe insulation, water heater setback, furnace filter alarms, and smart strips, along with others included in the figure below. These secondary measures can also offer energy savings, but oftentimes may be newer to energy efficiency portfolios and therefore not as vetted through third-party evaluations.

The figure below shows of the kit programs we reviewed, the percent that included specific measures.

Figure 4: Kit Measures Offered\*



\*Based on a review of program evaluations, see Appendix A for sources.

## REVIEW OF TRM SAVINGS FOR KIT MEASURES

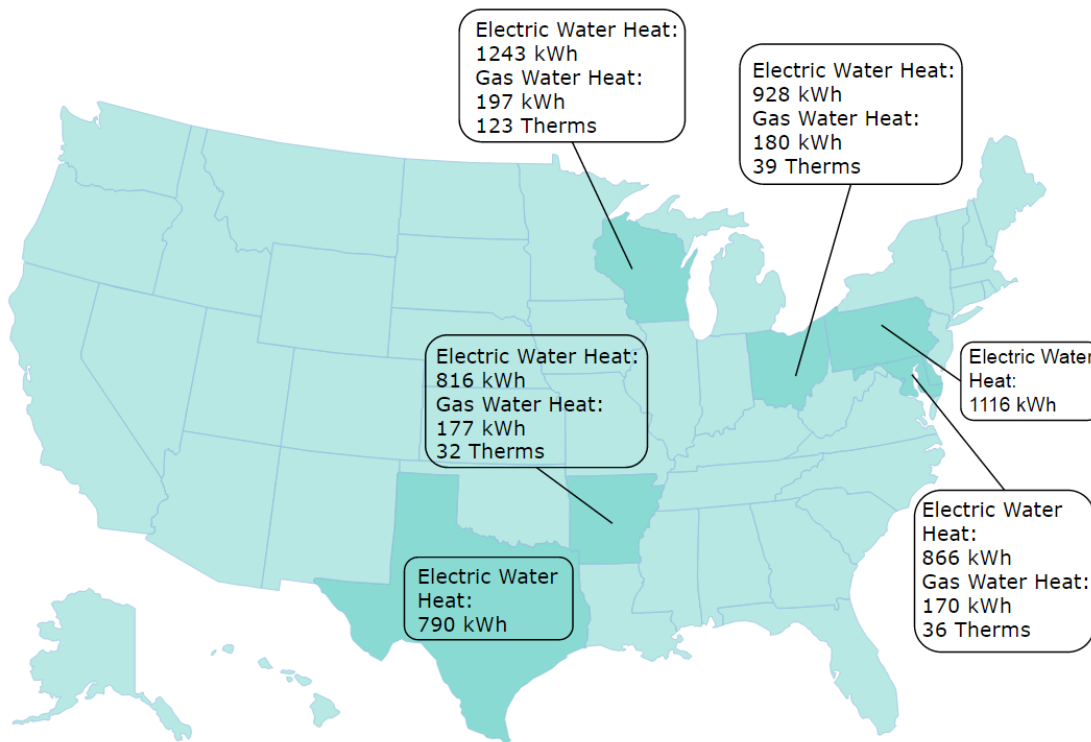
We also reviewed 6 different TRMs across the country for kit measures savings values. Most TRMs offer savings by measure rather than a “kit” savings per household. With this in mind, it is important to carefully plan the measure mix per home. The type of fuel targeted and other housing characteristics must also be taken into consideration. How many homes have electric water heating or space heating? How many have natural gas? What is the mix of single-family versus multi-family residences? These plans must be closely carried out and monitored to ensure that planned savings do not overestimate actual savings. This is critical in single fuel programs where measures must be installed in homes that have the targeted fuel type (electric vs. gas).

Below we summarize savings values for typical kit program measures from five different TRMs across the country. For comparison purposes, we constructed a “typical” kit and calculated a kit savings value for each TRM. Note that actual kits may vary depending on number and types of measures offered; this effort is meant to provide a comparison across jurisdictions. As such, we defined a typical kit as the following:

- 6 CFLs (3 13-watt, 2 18-watt and 1 23-watt)
- 2 bathroom aerators
- 1 kitchen aerator
- 2 high efficiency showerheads
- 6 feet of water heater pipe insulation

The figure below shows kit savings values based on the TRMs reviewed. Not surprisingly, large variations in savings values were not found once the kits contents were normalized. However, electric savings can vary greatly depending on the water heating source (electric or gas). If a home has an electric water heater, electric savings can be upwards of 1,000 kWh<sup>4</sup>. If a home has a gas water heater, electric savings are closer to 150 to 200 kWh. Natural gas savings are generally between 30 and 150 therms.

Figure 4: Savings from a “Typical” Kit



### Water Savings from Kit Measures

<sup>4</sup> One factor would be incoming water temperature to the home, which is going to be colder in the north than the south (colder water means more energy to heat the water).

While we did not specifically explore water savings as a part of our research, it is also important to acknowledge this source of non-energy savings. Some TRMs include water savings for kit measures (faucet aerators and showerheads), while others do not. The Wisconsin TRM does include per measure water savings estimates, as shown below. Added up over an entire participant population, these measures can result in significant water savings.

- **Bath faucet aerator (1.0 GPM):** 829 gallons/year
- **Kitchen faucet aerator (1.5 GPM):** 2,897 gallons/year
- **Showerhead (1.5 GPM):** 2,625 gallons/year

The Environmental Protection Agency's (EPA) WaterSense® program, much like ENERGY STAR, also partners with manufacturers, retailers, and other stakeholders to promote qualified products in the marketplace.<sup>5</sup> WaterSense products must meet specific consumption and performance criteria to receive the label.

As kit programs are continued or introduced by utilities, water savings should be considered and included in their cost-effectiveness algorithms. The Total Resource Cost (TRC) or Societal Cost tests integrate non-energy benefits into their calculations.

## KEY CONSIDERATIONS FOR OPTIMIZING KIT SAVINGS

Through this review we identified a number of common characteristics shared by the successful kit based programs. As utilities continue to offer or expand these models and as they launch in new jurisdictions, these elements should be considered or included within programs. Four major areas of best practices are discussed and included in a matrix below.

### *Customer Outreach*

Program participants often hear about kits through fairly low cost marketing efforts, such as bill inserts, community flyers, or direct mail (i.e. a letter from their utility). These mediums can be effective when reaching out to the general population. However, kit programs targeting specific customer segments can benefit from partnering with relevant sector-focused organizations that are already interacting with the desired customers. Low income programs in particular have traditionally partnered with local Community Action Agencies, and some kit programs also partner with other local community organizations or non-profits like churches, community associations, senior centers, etc., that also focus much of their work on assisting lower-income households.

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<sup>5</sup> For more information, go to <http://www.epa.gov/watersense/index.html>.

Direct install efforts also could consider a “neighborhood blitz” approach, where the program chooses a particular neighborhood that meets housing stock or other requirements, and goes door-to-door to sign up homes and complete direct installation of the kits on-the-spot. This approach may save program costs by reducing labor and transportation costs.

### *Customer Education*

Customers of kit programs should be given access to various types of educational media to appeal to different types of learners and knowledge levels. Ensuring that participants are educated about the kits makes it more likely that the measures will be installed and remain installed. Educational pamphlets or handouts, additional web resources, and videos should discuss the benefits of the kit devices, how to install them, and other potential low-cost/no cost actions that can be taken and/or other energy efficiency programs to be considered.

### *Training*

For direct install programs, provide adequate upfront and ongoing training to program representatives. Aside from training on customer service and the installation of the devices themselves, trainings should also cover how to identify opportunities for energy savings in the home with the kit devices and how to overcome or deal with potential installation barriers. Program reps should also have a base knowledge about other energy efficiency programs that a customer might be eligible for. Ongoing trainings should be offered regularly to address issues faced in the field, program requirements and protocols, etc.

### *Quality Assurance*

Direct install efforts should ensure that program representatives are correctly and thoroughly documenting the measures installed while in a customer’s home. Hand-held tablets or laptops enable an immediate record so that program achievement and savings can be accurately tracked.

Mailed or customer-installed kit programs could plan a quarterly postcard or online survey to get input from customers on satisfaction levels with the kit, the kit measures, and how many were installed. This feedback gives the program an idea of how the kits are being utilized and helps to identify any potential challenges that must be addressed. In order to encourage feedback, programs could consider providing an incentive for completing post-installation surveys.

The matrix below highlights different types of best practices by delivery method and for common customer segments to ensure a smooth program delivery and to maximize energy savings levels.

Table 1: Best Practices by Kit Program Type

		Outreach			Education			Training		Quality Assurance	
	Kit Program Type	Bill Inserts, Flyers, Direct Mail	Partner with Other Orgs	Neighborhood Blitz	Provide Various Mediums (pamphlet, videos)	Offer Workshops	Connect Energy to Money	Maximize/Optimize Measures Per Household	Provide Ongoing Training	Document Measures Installed On-Site	Post Survey Incentives
Delivery Type	Direct Install	☑		☑	☑		☑	☑	☑	☑	
	Mailed	☑			☑	☑	☑				☑
	Online Audit	☑			☑	☑	☑				☑
	Home Audit				☑		☑	☑	☑	☑	
Customer	Low-Income	☑	☑	☑	☑	☑	☑	<i>Varies by Delivery Type</i>			
	Multi-Family	☑	☑		☑		☑	<i>Varies by Delivery Type</i>			
	K-12 Education		☑		☑		☑				☑

## OPPORTUNITIES FOR GROWTH

Kit programs have a continued opportunity to grow as a part of energy efficiency portfolios. These models can help engage hard to reach customers, provide efficiently delivered energy savings to program portfolios, and can help serve as a “gateway” to other programs, ultimately deepening energy savings opportunities at the individual customer level. Specifically, there is an opportunity to advance the link between behavioral savings and kit programs, to more deeply segment and target customers being recruited through kit programs, to introduce new or emerging technologies into markets, and to leverage the customer goodwill that providing kits can offer in non-energy efficiency efforts at utilities such as a retention or sign up reward in competitive energy markets where customers have choice in electric providers.

### New and Emerging Jurisdictions

Kit programs are particularly well-suited to jurisdictions new to the energy efficiency space. Newly established energy efficiency portfolios may seek to establish their brand and create program recognition, lending itself to a broader approach such as a general mailing of energy saving kits. Kits can assist in engaging customers and bringing their attention to the benefits of energy efficiency, introducing potential next steps like finding out more about another program, and increasing customer satisfaction with the utility.

Offering energy savings kits as a part of another program can also build demand— attracting new customers that may not have otherwise considered a particular program offering.

### Opportunities to Maximize Behavioral Savings

As previously noted, kit measures are typically low cost and easy to install, allowing them to be accessed by practically all customer segments. Behavioral changes that lead to a decrease in energy or water consumption in the home are also by nature low/no cost and easy to implement on one’s own, making them a complimentary partner to kit programs.

Behavioral programs often involve a mailed report outlining a customer’s energy consumption compared to the previous month or to a group of his or her peers. Additionally, tips or recommendations are typically given on how to reduce energy usage further. Customers are often able to sign up for additional services to learn more about their energy consumption, such as an online account or dashboard, or an emailed report. To encourage customers to sign up for these supplemental services, programs could consider offering energy kits as a reward. This would offer



behavioral programs additional energy savings through the kits themselves, and potential energy savings down-the-line as more customers become engaged with other platforms of information, deepening their understanding of energy consumption and increasing their knowledge of energy saving actions to take.

## Customer Segmenting and Targeting

Mature energy efficiency portfolios may already have established name recognition and energy efficiency program offerings. While they may have captured the low-hanging fruit on an aggregate scale, when assessed at the micro-scale opportunities may come to the surface. For example, a mature energy efficiency portfolio might have high customer awareness in its urban or metro markets, but lower awareness in rural markets. Similarly, CFL penetration may be high in single family homes, but much lower in multi-family homes. In both of these cases, program administrators might consider offering energy kits as a way to increase awareness in a specific geography or with a certain customer demographic.

Mature portfolios could also consider kits as an add-on to existing programs to maximize energy savings and cost-effectiveness. Typical pairings might include Home Performance with ENERGY STAR or an online audit program. Including a kit can offer energy savings in places where none would have accrued otherwise, like when a customer decides not to follow-through with the building shell recommendations from a home energy audit.

## Use Kits as a Way to Introduce New Technologies

Kits can also be used as a mode to introduce new energy saving devices to a customer population or segment. Note that “new” does not mean untested. Any products included in a kit should ideally meet either ENERGY STAR or WaterSense specifications, or those of another known third party. One example is the inclusion of an advanced power strip (APS) in a kit. Studies have shown that electronics are an increasing portion of home energy use.<sup>6</sup> Advanced power strips can have a practical application in today’s home, but have not yet fully penetrated the market. Another “new” technology that may fit well into standard kit offerings is an LED bulb. LEDs are more expensive than CFLs, but have come down significantly in price in the past couple years. Many standard LED A-lamp bulbs are now also ENERGY STAR certified, and market penetration is quite low.

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<sup>6</sup> ENERGY STAR, “How Small Devices are having a Big Impact on U.S. Utility Bills”, [[http://www.energystar.gov/ia/partners/prod\\_development/downloads/EEDAL-145.pdf](http://www.energystar.gov/ia/partners/prod_development/downloads/EEDAL-145.pdf)].

Delivery of these “new” measures through a kit program provide a way to introduce them to a segment of participants on a limited basis and test customer response and acceptance.

## Non-Energy Efficiency Efforts

In competitive energy markets, utilities could consider using energy kits as a useful customer recruitment and retention tool. Studies have found increased customer satisfaction due to kit programs. An evaluation in Missouri found that approximately one-half of respondents said their opinions of the utility company improved based on their experience with the kit program. Evaluations in Oregon and Wisconsin also reported high levels of customer satisfaction with the energy kits.

## B. CONCLUSIONS

Energy kits have maintained an established presence in the energy efficiency arena since the 1990s, and have proved to be a versatile way to engage customers through a variety of different programs and delivery types, all while offering consistent energy savings to energy efficiency portfolios throughout the country.

There continue to be opportunities to affect energy savings and customer satisfaction using energy kits, such as establishing or increasing customer awareness for energy efficiency in general or for specific programs, reaching out to hard-to-reach customer segments, introducing new technologies, offering as a part of behavioral programs, or for non-energy efficiency efforts such as a customer recruitment and retention tool in competitive energy markets. Best practices can be incorporated into program design and implementation, ensuring that energy savings and operational efficiencies are maximized.

## APPENDIX A: EVALUATIONS REVIEWED AND SOURCES

Jurisdiction	Program Name	Year of Publication	URL
Wisconsin Focus on Energy	Multifamily Direct Install	2014	<a href="https://focusonenergy.com/sites/default/files/FOC_XC_%20CY%2013%20Evaluation%20Report_Volume%20II.pdf">https://focusonenergy.com/sites/default/files/FOC_XC_%20CY%2013%20Evaluation%20Report_Volume%20II.pdf</a>
	Express Energy Efficiency		
Energizing Indiana	Home Energy Assessment (HEA)	2013	<a href="http://aceee.org/files/pdf/2012-indiana-emv-report.pdf">http://aceee.org/files/pdf/2012-indiana-emv-report.pdf</a>
	Energy Efficient Schools (EES)		
Con Edison	Residential Direct Installation Program	2013	<a href="http://www.coned.com/energyefficiency/PDF/Residential%20Direct%20Install%20Process%20Evaluation%20Report.pdf">http://www.coned.com/energyefficiency/PDF/Residential%20Direct%20Install%20Process%20Evaluation%20Report.pdf</a>
Xcel Energy Colorado	Energy Savings Kit Program	2012	<a href="https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/CO-2012-Energy-Savings-Kits-Final-Evaluation.pdf">https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/CO-2012-Energy-Savings-Kits-Final-Evaluation.pdf</a>
IPL Iowa	School-based Energy Education	2012	<a href="http://www.state.ia.us/government/com/util/energy/energy_efficiency/Alliant/Annual%20Reports/Annual_Report_for_Program_Year_2011.zip">http://www.state.ia.us/government/com/util/energy/energy_efficiency/Alliant/Annual%20Reports/Annual_Report_for_Program_Year_2011.zip</a>
	Low Income EnergyWise Education	2012	<a href="http://alliantenergy.com/wcm/groups/wcm_internet/@int/documents/document/mdaw/mdey/~edisp/012894.pdf">http://alliantenergy.com/wcm/groups/wcm_internet/@int/documents/document/mdaw/mdey/~edisp/012894.pdf</a>
CA	Home Energy Efficiency Survey	2013	<a href="http://calmac.org/publications/HEES_Final_Report_20130708.pdf">http://calmac.org/publications/HEES_Final_Report_20130708.pdf</a>
West Penn Power Company	Residential Home Performance Program	2012	<a href="https://www.firstenergycorp.com/content/dam/customer/Customer%20Choice/Files/PA/ACT129/West%20Penn%20Power_PY3%20Final%20Annual%20Report_2012_11_15.pdf">https://www.firstenergycorp.com/content/dam/customer/Customer%20Choice/Files/PA/ACT129/West%20Penn%20Power_PY3%20Final%20Annual%20Report_2012_11_15.pdf</a>
	Limited Income Energy Efficiency Program		
	Joint Utility Usage Management Program		
Energy Trust of Oregon	Energy Saver Kits	2009	<a href="http://energytrust.org/library/reports/ETO_HES_Process_and_Impact_Report_Volume_1.pdf">http://energytrust.org/library/reports/ETO_HES_Process_and_Impact_Report_Volume_1.pdf</a>
			<a href="http://energytrust.org/library/reports/ETO_HES_Process_and_Impact_Report_Volume_2.pdf">http://energytrust.org/library/reports/ETO_HES_Process_and_Impact_Report_Volume_2.pdf</a>
Ameren Missouri	RebateSavers	2014	<a href="https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=935842415">https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=935842415</a>

Pacific Power	Home Energy Savings	2012	<a href="http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/CA_Home_Energy_Savings_Program_Evaluation_2009-2010.pdf">http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/CA Home Energy Savings Program Evaluation 2009-2010.pdf</a>
Duke Energy KY	Personalized Energy Report	2007	<a href="http://psc.ky.gov/PSCSCF/2007%20cases/2007-00369/Duke_Annual%20Data%20Report%20Appendix%20DE_111507.pdf">http://psc.ky.gov/PSCSCF/2007%20cases/2007-00369/Duke Annual%20Data%20Report%20Appendix%20DE_111507.pdf</a>
	Energy Efficiency Web Tool		

## APPENDIX B: TRMS REVIEWED AND SOURCES

Source	URL
OH TRM	<a href="http://www.puco.ohio.gov/puco/">http://www.puco.ohio.gov/puco/</a> (provided by request)
PA TRM	<a href="http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_in_formation/technical_reference_manual.aspx">http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_in_formation/technical_reference_manual.aspx</a>
WI Focus on Energy TRM	<a href="https://focusonenergy.com/sites/default/files/Wisconsin%20Focus%20on%20Energy%20Technical%20Reference%20Manual%20August%202014_0.pdf">https://focusonenergy.com/sites/default/files/Wisconsin%20Focus%20on%20Energy%20Technical%20Reference%20Manual%20August%202014_0.pdf</a>
AR TRM	<a href="http://www.apscservices.info/EEInfo/TRM.pdf">http://www.apscservices.info/EEInfo/TRM.pdf</a>
TX TRM	<a href="http://texasefficiency.com/images/documents/RegulatoryFilings/DeemedSavings/trmv2%20vol%202%20residential%20%20--%20%20final.pdf">http://texasefficiency.com/images/documents/RegulatoryFilings/DeemedSavings/trmv2%20vol%202%20residential%20%20--%20%20final.pdf</a>
Mid-Atlantic TRM	<a href="http://www.neep.org/mid-atlantic-technical-reference-manual-v40">http://www.neep.org/mid-atlantic-technical-reference-manual-v40</a>

State	CFL		Faucet Aerator		Showerhead		Pipe Insulation		Power Strip		LED Nightlight		Water Heater Set-back	
	Meas #	Pg #	Meas #	Pg #	Meas #	Pg #	Meas #	Pg #	Meas #	Pg #	Meas #	Pg #	Meas #	Pg #
OH	-	17	-	89	-	93	-	97	-	76	-	-	-	-
PA	2.29	151	2.8	48	2.9	55	2.14	78	2.12	71	2.7	46	2.41	195
WI	-	265	-	172	-	209	-	201	-	-	-	-	-	-
AR	2.5.1. 1	143	2.3.4	108	2.3.5	114	2.3.3	105	2.4.4	137	2.5.1. 4	-	-	-
TX	2.1.1	2-3	2.4.1	2-126	2.4.2	2-133	2.4.3	2-140	-	-	-	-	-	-
Mid-Atl	-	19	-	161	-	156	-	170	-	228	-	-	-	-

## APPENDIX C: TRM SAVINGS CALCULATIONS

### CFLs

	Arkansas	Ohio	Pennsylvania	Texas	Wisconsin	Mid-Atlantic
	kWh	kWh	kWh	kWh	kWh	kWh
CFL, Direct Install, 23 Watt	36.54	42.69	52.95	39.30	41.00	40.31
CFL, Direct Install, 18 Watt	29.83	32.44	43.22	26.50	33.16	30.69
CFL, Direct Install, 13 Watt	26.85	24.01	38.90	24.10	29.84	22.66
CFL, Direct Install, 9 Watt	23.12	16.62	33.50	14.50	26.00	15.69
CFL, >22 Watts, Time of Sale	37.73	45.34	52.95	39.30	44.00	42.14
CFL, 17-22 Watts, Time of Sale	28.48	34.45	44.30	26.50	33.00	32.08
CFL, 12-16 Watts, Time of Sale	25.63	25.50	42.14	24.10	30.00	23.69
CFL, <12 Watts, Time of Sale	17.09	17.66	33.50	14.50	20.00	16.40

### Aerators and Showerheads

#### Electric Water Heating

	Arkansas	Ohio	Pennsylvania	Texas	Wisconsin	Mid-Atlantic
	kWh	kWh	kWh	kWh	kWh	kWh
Bathroom Faucet Aerator, 1.5 gpm	35.00	24.50	25.60	31.22	40.60	22.00
Bathroom Faucet Aerator, 1.5 gpm, HPWH	14.00	--	--	13.91	--	--
Kitchen Faucet Aerator, 1.5 gpm	35.00	24.50	220.30	31.22	294.00	22.00
Kitchen Faucet Aerator, 1.5 gpm, HPWH	14.00	--	--	13.91	--	--

MF Bathroom Faucet Aerator, 1.5 gpm	--	--	30.10	--	--	--
MF Kitchen Faucet Aerator, 1.5 gpm	--	--	146.90	--	--	--
Showerhead, 1.5 gpm	313.00	245.23	311.00	287.22	318.00	296.63
Showerhead, 1.5 gpm, HPWH	128.00	--	--	127.94	--	--
MF Showerhead, 1.5 gpm	--	--	271	--	--	--

Notes: AR calculations use the Fayetteville weather zone and TX calculations use Climate Zone 2. Note that while PA and WI provide separate calculations for kitchen and bath aerators the other states do not.

## Natural Gas Water Heating

	Arkansas Therm	Ohio Therm	Wisconsin Therm	Mid-Atlantic Therm
Bathroom Faucet Aerator, 1.5 gpm	1.46	1.09	1.79	0.98
Kitchen Faucet Aerator, 1.5 gpm	1.46	1.09	12.90	0.98
Showerhead, 1.5 gpm	13.20	10.96	14.00	13.22

Notes: AR calculations use the Fayetteville weather zone. Note that while WI provides separate calculations for kitchen and bath aerators the other states do not. PA and TX do not provide calculations for natural gas water heating.

## Water Heater Pipe Insulation

### Electric Water Heating

	Arkansas kWh	Ohio kWh	Pennsylvania kWh	Texas kWh	Wisconsin kWh	Mid-Atlantic kWh
Pipe Insulation, per foot, Electric	4.53	26.60	10.00	8.20	27.00	26.00
Pipe Insulation, per foot, HPWH	2.02	--	--	3.65	--	--

Notes: AR calculations use the Fayetteville weather zone and TX calculations use Climate Zone 2. All assume 0.75" diameter pipe.



## Gas Water Heating

	Arkansas Therm	Ohio Therm	Wisconsin Therm	Mid-Atlantic Therm
Pipe Insulation, per foot	0.19	1.20	0.52	1.15

Notes: AR calculations use the Fayetteville weather zone. All assume 0.75" diameter pipe. PA and TX do not provide calculations for natural gas water heating.

## Other Measures

	Arkansas kWh	Ohio kWh	Pennsylvania kWh	Mid-Atlantic kWh
LED Nightlight	--	--	22.00	--
Water Heater Temperature Set-back, Electric, 10 degrees	--	--	151.00	--
Water Heater Temperature Set-back, Electric, 5 degrees	--	--	76.00	--
Water Heater Temperature Setback, HPWH, 10 degrees	--	--	69.00	--
Water Heater Temperature Setback, HPWH, 5 degrees	--	--	35.00	--
Advanced Power Strips, 5-plug, Home Entertainment	241.70	--	62.10	--
Advanced Power Strips, 5-plug, Home Office	80.20	--	--	--
Advanced Power Strips, 5-plug, Unspecified	160.90	56.50	48.90	47.40
Advanced Power Strips, 7-plug, Home Entertainment	--	--	74.50	--
Advanced Power Strips, 7-plug, Home Office	--	--	--	--
Advanced Power Strips, 7-plug, Unspecified	--	102.80	58.70	47.40

Notes: The TX and WI TRMs do not provide calculations for any of the above measures.