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Energy Center of Wisconsin

**with the assistance of**

- Wisconsin K-12 Energy Education Program
- Cool Choices

# KEEP Enrichment Pilot

## Activity summary and results

September 19, 2014

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*Activity summary and results*

September 5, 2014

*Author*

Tracy La Haise, Senior Project Manager

749 University Row, Suite 320  
Madison, WI 53705  
608.210.7120  
[www.ecw.org](http://www.ecw.org)

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Tracy La Haise  
Senior Project Manager

#### Acknowledgements

Energy Center of Wisconsin staff who contributed to this project include Ingo Bensch, Erikka Byrge, Karen Koski and Andrea Minniear-Cherney.

Wisconsin K-12 Energy Education Program staff who contributed to this project include Sara Windjue, Susan Schuller, Kelly Smith, Jamie Mollica and Annie Baker.

Cool Choices staff who contributed to this project include Kathy Kuntz, Emily Loew and Raj Shukla.

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## EXECUTIVE SUMMARY

The Wisconsin K-12 Energy Education Program (KEEP) is a program of the Wisconsin Center for Environmental Education (WCEE), which is located within the University of Wisconsin-Stevens Point College of Natural Resources and the University of Wisconsin-Extension - Cooperative Extension. KEEP has been providing energy education through a “teach the teacher” model and the dissemination of energy education curricula in order to improve the energy literacy of Wisconsin’s teachers and students since 1995. In addition to a long history of improving educators’ energy knowledge and teaching skills, the program has a well-developed network of participants. According to KEEP’s participation statistics, more than 6,000 teachers have participated in a graduate-level KEEP course since 1997. By extension, it is estimated that these KEEP-trained teachers have reached nearly 3 million Wisconsin students.

Over the years, KEEP has received base funding from the Energy Center, Focus on Energy, and a consortium of Wisconsin’s energy utilities, with other support coming from UW-Stevens Point, other grants and gifts. Most recently, the program is providing energy- and energy efficiency-related education statewide through December 31, 2014 with the aid of funding from Wisconsin’s energy utilities.

In conjunction with their financial support, Energy Center members requested that the Energy Center explore whether and how KEEP might add program elements that address the desire for more immediate, documentable energy savings in addition to continued delivery of energy education. In particular, there was interest in addressing the following goals:

- Enrich existing KEEP curriculum and teacher training
- Build on existing KEEP history, network and credibility
- Track learning outcomes and impacts
- Widen the program’s focus to include school and home impacts
- Leverage Focus on Energy programs and services
- Demonstrate cost-effectiveness

To meet these goals, the Energy Center collaborated with KEEP staff members to design program enhancements that added a mechanism to better track and understand the energy savings that result from energy education activities in the classrooms—whether at the school or in students’ and teachers’ personal lives. We also added program elements that more explicitly promoted energy efficient choices by students, their families, teachers, and school facility managers. We took care to design program elements that could be implemented in a pilot format within the 20132014 school year without undue disruption to planned KEEP activities. As a result, the KEEP enrichment pilot concentrated on three efforts: data collection and reporting, energy use and behavior change, and school building performance improvement. Pilot effort design and planning began in January, 2014, with implementation continuing through August of this year. We did not complete a study of the cost-effectiveness of the program.

This report describes our pilot efforts to test the infusion of more near-term energy savings efforts alongside KEEP’s energy education mission; presents the results of those efforts and makes suggestions for future activities. In order to acknowledge KEEP’s long-term energy education effects, the report also contains a brief discussion of KEEP’s role in enhancing Wisconsin students’ energy literacy.

The report is organized as follows:

- We begin with a description of KEEP and indicators of its impact on energy education and literacy in Wisconsin.
- Then, we present each of the pilot initiatives we incorporated during the first part of this year and their results. The initiatives are organized by pilot effort: data collection and reporting, energy-related behavior change, and school building performance improvement.
- Finally, we discuss next steps and recommendations for future activities to add an energy savings component to the long-term goals of KEEP to enhance energy education.

We will comment that our findings from the pilot should be viewed from the perspective of proof-of-concept only. The short timeframe of the pilot did not allow us to determine the magnitude of participation or achievable short-term energy savings impacts from behavioral activities. Rather, the pilot efforts demonstrate what might be possible in a strategic transformation of KEEP from a long-term-focused energy education program to one that also seeks to facilitate or induce immediate energy-saving practices and choices.

Nevertheless, the school building performance improvement segment of the pilot identified 48 potential energy efficiency measures across four schools that would result in savings of 1,172,964 kWh and 36,543 therms if implemented. The results of the energy-related behavior change pilot effort add up to more than 22,188 sustainable actions by 463 participants, including those that will result in energy savings. In all, new energy-saving actions that had not been taken before—mostly activities done at home—resulted in an estimated annualized impact of about 25,400 kWh and 58 therms. These figures may be conservative in that they represent only those actions recorded in the Cool Choices game.

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## Key Takeaways

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We have several key takeaways from the pilot. First, as a robust network of topical experts and participants that connect energy efficiency and initiatives to change energy-related behaviors in our daily lives, KEEP serves as a trusted foundation or “hub.” By providing energy-related resources for schools, the program influences behaviors and attitudes using a long-term, educational approach.

Second, in parallel to broad-based energy education, KEEP can spur near-term energy savings as well. Indeed, a subset of the energy lessons provided by KEEP to teachers directly address precursors to energy efficient practices by students, including why energy consumption matters; what its impacts are; how people use energy; and how they can use energy more efficiently.

Hence, while not designed to be an energy efficiency program per se, KEEP does have the potential to affect the practices of students at home and in the school. Further, engaging teachers in more active teaching of energy education can affect their energy practices and could potentially lead to energy efficiency upgrades or renewable generation within the school facilities themselves.

Finally, from our synthesis of the findings from all three KEEP enhancement pilot efforts and proof-of-concept activities, we learned that:

- KEEP is held in very high esteem by its alumni



- Some KEEP energy concepts can be linked to everyday life choices related to energy use and energy efficient practices
- With the right activities, KEEP can extend its influence from just teachers to households and school buildings, as well
- Some energy impacts are easy to track at a reasonable cost; for others we can track only indicators of impacts
- Building a basic system to track the results of educational activities does not require a major investment of resources
- Teachers need to be motivated to enter information into a data tracking system
- KEEP can be leveraged to drive behavioral actions
- Enhancing KEEP with technical support can generate qualified leads for Focus on Energy
- Program enhancements designed to capture short-term energy savings can be developed

## KEEP PROGRAM DESIGN

A study of the possibilities of what KEEP could accomplish also merits a brief discussion of what the program is designed to, and has achieved. KEEP is designed to support energy literacy of Wisconsin residents by providing primary and secondary school teachers at all grade levels with resources and training on how to educate students on a broad variety of energy topics. KEEP is a long-term, holistic educational strategy. The program's intent is to increase the energy literacy among K-12 students that can lead to positive impacts throughout their lives, even as they grow into adults with their own households.. As a result, KEEP plays an important role in how energy efficiency *is learned*.

Energy awareness begins with the teaching of basic cognitive skills, including knowledge of what energy is and where it comes from; practical knowledge of how energy is used and impacts everyday life; and the ability to find and objectively assess this information. By helping students develop values and attitudes, they learn the impacts of their own choices and decisions. KEEP also provides students with a sense of efficacy, by empowering students with knowledge of how they and their families can modify their behaviors. Students are more receptive (than adults) to new concepts and can act as both educational agents and opinion influencers at home.

It is important to understand the different, yet still complementary, approaches taken by KEEP and mainstream energy efficiency programs. While mainstream programs focus on short-term resource acquisition by program year, KEEP uses education to infuse the significance of energy and wise energy use into teachers' and students' values. In this manner, KEEP creates a population inoculated with energy information, which supports the traditional energy efficiency programs' appeals to save energy. KEEP can be considered a precursor to short-term energy savings. While it is difficult to quantify KEEP's influence and the energy savings and behavioral changes that result from this long-term approach, there are numerous indicators that suggest KEEP has contributed to this goal throughout its duration.

A baseline study of KEEP activities conducted by the Energy Center of Wisconsin in 1999 is one example. The study was an attempt to research the impacts of the program. Although the study supported having energy education as an integral part of the school curriculum, it was not designed to quantify the

causal relationship between students' energy knowledge and their energy-related behavior. However, the data were examined to assess the strength of this relationship. Students with higher energy knowledge scores were more willing to take energy conservation actions, to report having taken such an action in the past, and to have more positive attitudes toward energy conservation and education.

There are other indicators that suggest that KEEP facilitates and contributes to energy education of Wisconsinites in a positive way. We highlight two such indicators here:

- **KEEP Evaluation**—In an unpublished impact evaluation of KEEP in 2002, a contractor to the Energy Center concluded that KEEP-trained teachers largely were using the resources provided by the program and that KEEP seemed to be improving energy education. It was unclear whether the extent of energy education in the state (by all teachers—KEEP-trained and non-KEEP teachers) had increased since a baseline study conducted five years earlier. At the time, KEEP was found to be familiar to only a small share of the state's teachers.
- **KEEP Course Evaluations**—Teachers who have completed KEEP courses, during which they learn how to teach energy-based lessons, give the program highly positive scores. In particular, participants gave extremely high marks on the objectives KEEP set out to achieve. Additionally, participants reported increasing their energy knowledge by completing the course. Several educators referenced including and integrating energy efficiency and behavior change into non-energy based courses.

### **KEY METRICS FROM COURSE EVALUATIONS**

An evaluation of KEEP's current teacher education courses shows that participants are satisfied with the courses and find the courses helpful to their teaching professional development. (Note: these metrics are for 2013 courses; other course years follow the same trends.):

- Objective scores range from 4.50 to 5.0 on a 5 point scale
- Energy knowledge prior to KEEP course range from 2.97 to 3.44 on a 5 point scale
- Energy knowledge after KEEP course range from 4.44 to 4.83 on a 5 point scale
- Percent that would recommend taking a KEEP course to a colleague was 94 to 100 percent

### **KEY METRICS FROM ALUMNI SURVEY**

**KEEP Alumni Survey**—In a survey fielded in association with our KEEP pilot efforts this year, teachers who have taken KEEP courses in the past five years (i.e., KEEP alumni) also gave high marks to KEEP for helping them increase student knowledge and understanding about various aspects of energy. Some of the verbatim responses follow:

- As result of taking a KEEP course I am comfortable with my ability to integrate energy concepts into my curriculum 4.22 on a 5 point scale
- This KEEP course improved my ability to increase student knowledge about energy 4.36 on a 5 point scale

- This KEEP course improved my ability to encourage students to use energy more efficiently 4.43 on a 5 point scale

More telling, however, is that KEEP alumni gave their most positive responses to a question on whether they were able to encourage students to use energy more efficiently as part of their energy education. Respondents mentioned a wide variety of innovative teaching methodologies adopted as a result of the KEEP curriculum including, but not limited to, solar power kits, energy use and consumption, music education on energy use and even producing concerts on energy efficiency and green practices. The respondents indicated that as a result of KEEP they have integrated energy efficiency into math, engineering, architectural design, art, music and more indicating a wide sphere of influence amongst a myriad of subject matters. These results show not only that KEEP alumni actively teach energy education, but also that they found KEEP's resources and courses to be a helpful resource in doing so.

Furthermore, a vast majority of KEEP alumni (84 percent) indicated that they were likely to participate in future KEEP course offerings. Granted, the 1023 survey respondents were a self-selected group, but we received an excellent response rate of 18 percent (182), which may indicate that teachers feel involved in and connected to KEEP. Certainly, having 150 KEEP teachers indicate that they were likely to participate in a KEEP course again shows that KEEP fills a need.

Finally, additional comments from KEEP alumni demonstrate that the information learned by taking a course reaches farther than just the classroom. Here are just a few examples we collected:

- “Not only has my participation in KEEP course helped me to teach energy concepts, but my colleagues have been able to add concepts to their classrooms as I have shared them. I have also had the opportunity to have numerous discussions with family members about the concepts I have been learning in the Biofuels course. I have had some attitudes changed and have helped others see the issues more clearly as well.”
- “I absolutely enjoyed taking this course. It was an invaluable resource for my school, as well as, my home. I have discussed this course so much that colleagues are considering taking future courses. I definitely plan to expand my knowledge base by taking additional courses. I love how I am still receiving information even though the course is over. It keeps me cognizant that resources are available and the KEEP staff is genuinely concerned about energy conservation.”
- “I always take/learn something(s) practical and easy to incorporate right away in both my professional and personal life. These are materials I use either on their own, to modify to meet the needs of specific students, or have to support units. I just looked at my professional books in my back room and so many are Project KEEP. They have bent spines, pages loose from so much use and post-its everywhere. I have to say "Thank you!" to everyone who designed, taught, and supported this program.”
- “I have shared the information about the KEEP program with friends and several have signed up to participate. It is a great program with an important mission.”

## PILOT INITIATIVES

We decided to devise discrete efforts that could be implemented and studied over a limited time frame. These efforts would also add robustness to the program by filling some immediate program needs. Three issues were identified as needing attention, including:

- Assist with tracking of program results in an easily accessible format;
- Evaluate the influence of KEEP on behavior change; and
- Encourage the implementation of energy saving school building improvements and connect school districts with Focus on Energy incentive programs.

Following a kick-off meeting, Energy Center and KEEP staff members divided into working subgroups to collaborate on a particular effort based upon their expertise. Implementation followed an approach that was both stepwise and iterative—pilot efforts were developed through subgroup consensus and, once identified, implemented by the members of the subgroup.

## ONLINE DATA COLLECTION

As a behavioral program, KEEP has not been required to collect, maintain or report data on energy savings impacts. Data collection about the program has been informal and limited, primarily related to the number of participants, their schools, the number of students taught and participants' satisfaction with the program. As a result of the Online Data Collection pilot effort, an online, centralized data collection system was created by Energy Center staff. The goal of developing this tool is to allow for centralized tracking of teachers' use of KEEP activities. The system allows teachers and students to use the system to track results of completing energy-savings actions as class activities and student assignments, submit photos or videos of activities and report anecdotes.

To formalize KEEP's data collection process for this pilot, we developed an interactive website, [KEEPinAction.org](http://KEEPinAction.org). To integrate the website with KEEP curriculum, a modification of the existing Appliance Survey (used in concert with two of KEEP's lessons, "At Watt Rate?" and "The Cost of Using Energy," and in an online course for teachers) was added to the KEEPinAction website. Results from this survey were stored in a table which was tailored to each classroom, enabling teachers to track and follow up on energy actions promised by their students.

The goal of the modified Appliance Survey was to enhance student learning by prompting them with specific questions and linking them to resources to help them make informed behavior changes. Tactics used to achieve this goal include:

- Enhancing KEEP lessons with specific questions and assignments that will leverage learning to encourage the implementation of energy-savings actions
- Tracking action results through the use of a robust, centralized data collection system
- Enabling reporting on indicators of KEEP influence and energy savings achievement
- Enabling future use of KEEP's current online Appliance Survey as a template to create new online data collection tools for teachers to use as additions to their current curriculum (i.e. Take Action questions incorporated into all KEEP activities) or as a standalone piece. These activities

should include an educational component and a Take Action component (similar to KEEP's online Appliance Survey)

## **ENERGY-RELATED BEHAVIOR CHANGE**

Green and Healthy Schools Wisconsin, the Wisconsin Department of Public Instruction and WCEE partnered with Cool Choices to offer the Cool Choices game at no cost to those schools working toward Green and Healthy School certification. KEEP was the administrator of the game for the schools that volunteered to play. Since this activity was already scheduled, and would not have occurred in the absence of KEEP, we took advantage of this timely opportunity to make use of it in our investigation of energy-related behavior change in participating schools.

Cool Choices is an interactive online game where participants play “cards” by performing the pro-environmental behavior indicated on the card (e.g. reduce speed when driving, unplugging unused appliances/electronics, etc.) and receive points by completing the action. A typical Cool Choices game includes cards on water usage, driving behaviors, energy use, environmental factors, and health and wellness. For our purposes we focused on the energy saving actions.

In the first round of the Cool Choices game the energy usage cards were the typical ones used in a Cool Choices game with the addition of a few school based energy cards that would correspond to the Green and Healthy Schools application since completion of the program application was a primary objective of the game. However, this round provided limited energy savings activities and specific applied learning activities as it was not designed to save quantifiable kWh and therms. For the second round of the Cool Choices game the Energy Center of Wisconsin worked with Cool Choices and KEEP to modify the energy use cards and add new cards. We took a three stage approach to modifying and adding cards:

- Phase 1: Cards were added to encourage energy actions that could be largely done in the home
- Phase 2: Cards with “scavenger hunt” type actions in which players were asked to report on the existence of policies (e.g., a purchasing policy that mandates the purchase of energy efficient equipment) or measures (e.g., insulation or lighting controls) in schools were modified to include actions that would facilitate school energy savings
- Phase 3 cards: New “bonus” type cards were added, taking what was learned in phases one and two and identifying new opportunities within the school to improve energy efficiency

## **SCHOOL BUILDING PERFORMANCE IMPROVEMENT**

In the spring of 2014, KEEP partnered with the Energy Center to provide four schools with a site assessment and a whole building energy analysis (i.e. building energy model), with the results of the analysis being the focus of the audit reports. The Energy Efficient School Buildings segment of the pilot provided an energy audit based on the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standards for commercial audits.

The resulting schools that participated were first identified by KEEP staff at the district level as those who would likely participate in KEEP's NRES 634 School Building Energy Efficiency Education course in spring of 2014. KEEP staff then communicated with the districts to ascertain interest in the course and

corresponding energy audit. After learning the details of the audit, the districts then determined which school would receive the greatest benefit from an audit and the staff that would participate in that audit.

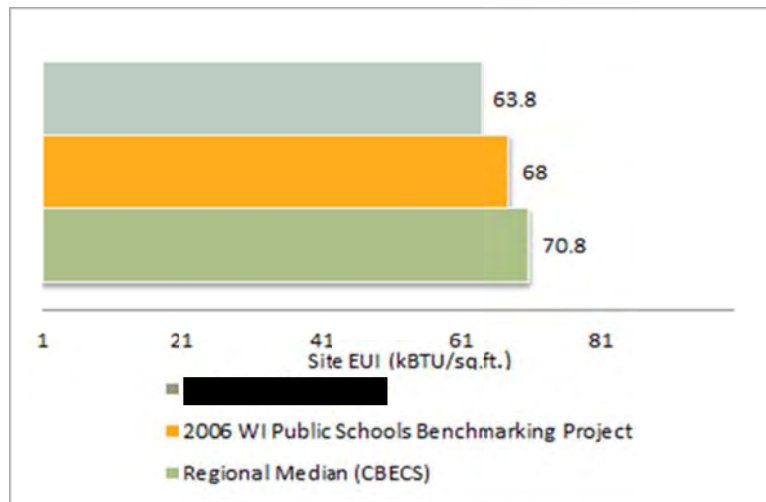
Energy Center developed a pre-audit questionnaire with basic questions about the school operations and primary building systems within the facility, which was distributed by KEEP staff when setting up the audits. A request for utility usage data and floor plans of the school building were also requested at this time. The purpose pre-audit data collection was to build a preliminary picture of the building and energy usage in advance, to make efficient use of auditor time during the site visit. In some cases, the school or district staff was not able to obtain utility usage data or floor plans until after the site visit.

Site visits were conducted in March and April, and attended by Energy Center and KEEP staff members. A building engineer, head custodian, or facilities manager from the school or district typically guided the audit team through the facility. Extensive photos were taken of the site, including some infrared photos, to highlight key areas of air infiltration, typically around door and window assemblies.

After site visits were completed, Energy Center staff analyzed the collected data. The major building systems evaluated include the building envelope, lighting, and mechanical systems. Other equipment like kitchen appliances, electronics, and office equipment were also analyzed. The details of the facility were inventoried and described in detail in each report. Each report contains an energy use summary. Energy usage was analyzed separately and also disaggregated into end uses. Historical energy consumption was represented in a bar graph for each fuel. Gas usage data was weather normalized to adjust for annual differences in weather.

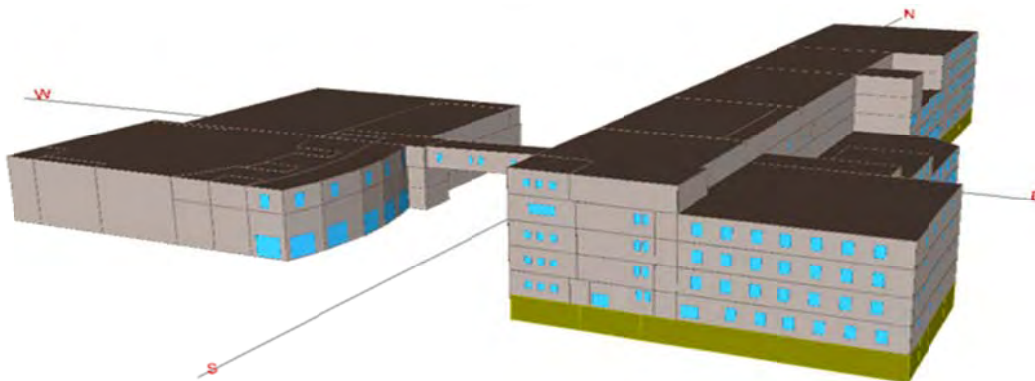
An energy baseline was developed and an estimated energy usage index was calculated to compare against benchmarked standards. For this study, the team used two benchmarks, The U.S. Department of Energy's national Commercial Building Energy Consumption Survey database, and the 2006 Wisconsin Public Schools statewide benchmarking project. This included a study of 1,293 schools in 226 districts, representing more than 60 percent of the state's public K-12 schools. A sample graph, *Figure 1: [REDACTED] EUI compared to benchmarking standards*, follows.

Figure 1: [REDACTED] EUI compared to benchmarking standards.




















A building energy model of the baseline was created in DOE-2.2 using eQuest version 3.64 software. The model was created using the all of the data gathered during the audit, including facility construction documents. *Figure 2:* [REDACTED] eQuest 3.64 building model depicts the model and associated geometry.

Figure 2: [REDACTED] eQuest 3.64 building model.



After baseline modeling, a series of proposed energy efficiency measures were compiled. These measures were then analyzed using the building energy model to quantify the potential savings impact of each. The itemized recommendations focused on lower-cost solutions, with some opportunities for larger capital improvements included, if appropriate. A summary of the potential cost savings and associated opportunities for financial incentives was created for each report (see the sample for the [REDACTED] [REDACTED] in *Table 1:* [REDACTED] *Energy Model Results Summary with estimated financial savings*, below). From the analysis of the existing conditions and energy usage of the building, potential measures were identified as recommendations for possible future improvements to the building to increase energy efficiency.

**Table 1: [REDACTED] Energy Model Results Summary with estimated financial savings.**

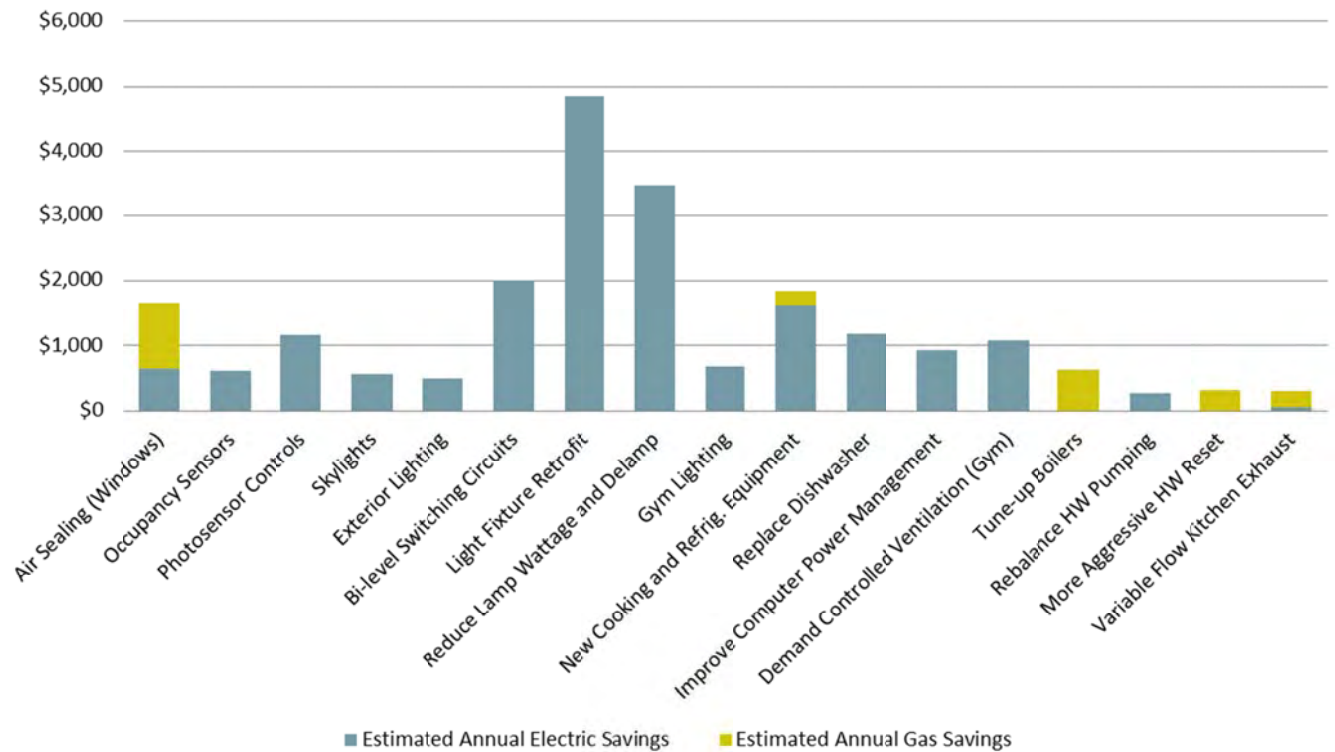
[REDACTED] Energy Model Results Summary					
Measure #	Energy Conservation Measure	Annual Estimated		Estimated Cost*	Estimated Focus on Energy Incentive**
		Energy Cost Savings	Estimated % Savings		
1	Air Seal all windows	\$1,658	 2.5%	\$\$	0
2	Install occupancy sensors	\$611	 0.9%	\$	\$164
3	Install photosensor controls	\$1,159	 1.7%	\$\$\$	\$324
4	Add skylights	\$552	 0.8%	\$\$\$	\$0
5	Replace exterior lighting	\$499	 0.7%	\$\$	\$157
6	Add bi-level switching circuits	\$2,018	 3.1%	\$\$\$	\$568
7	Full light fixture retrofit	\$4,842	 7.7%	\$\$\$	\$1,330
8	Reduce lamp wattage and delamp	\$3,459	 5.4%	\$	\$950
9	Replace gym lighting	\$679	 1.0%	\$\$	\$189
10	Procure new cooking/refrig. equipment	\$1,828	 2.8%	\$\$	\$1,000
11	Replace dishwasher	\$1,161	 1.8%	\$\$	\$600
12	Implement better computer power management	\$915	 1.4%	\$	\$290
13	Demand controlled ventilation in gym	\$1,074	 1.6%	\$\$\$	\$314
14	Tune-up boilers thoroughly	\$632	 0.9%	\$\$	\$0
15	Rebalance HW pumping	\$281	 0.4%	\$	\$67
16	Implement more aggressive HW reset	\$322	 0.5%	\$	\$198
17	Variable flow kitchen exhaust	\$303	 0.5%	\$\$\$	\$168

**Notes:**  
 Each ECM is analyzed individually.  
 \* Cost legend: \$ = no/low cost measure, \$\$ = moderate cost measure, \$\$\$ = capital improvement  
 \*\* Prescriptive incentive amounts estimated by using custom incentive rates due to undefined scope  
 Incentives and measure qualifications are subject to change (Refer to current "Summary of Services and Incentives" for current values)

*Figure 3: [REDACTED] estimated interactive annual energy savings by measure* illustrates the estimated annual energy savings for each individual measure, which takes into account the interaction of savings between electricity and natural gas. The blue portion of the bar represents electric savings and the gold represents gas savings. Where some gas usage increases to improve a higher level of electrical savings, that value is removed so the entire bar represents the net savings that remains between the interaction of fuel types.



**Figure 3: [REDACTED] estimated interactive annual energy savings by measure**



Based on the data collected during each site visit, Energy Center staff developed a preliminary high level list of recommendations for the facility and then created a short presentation that highlighted proposed measures. KEEP and Focus on Energy staff made the presentation to the participants in the NRES 634 courses. Teachers, administrators, and facilities staff learned about the energy savings opportunities outlined in each site visit. Course participants had the opportunity to use the results of the audits in their curriculum and energy action plans, which in turn supports district-wide energy efficiency goals in the classroom.

Energy Center staff then analyzed the data collected in the audit, calculated potential savings and created a report of the findings with detailed recommendations. Energy Center and KEEP staffs met with the Focus on Energy advisor assigned to the district to share results of the analysis. The Focus on Energy advisor then estimated incentive opportunities and provided a guide to the appropriate program for the corresponding proposed measures.

When the report was complete, Energy Center, KEEP, utility and Focus on Energy staffs jointly presented the final reports to the school and district staff—sharing next steps on how to go about implementing measures and applying for incentives.

## PILOT FINDINGS

### **ONLINE DATA COLLECTION**

The online data collection system, KEEPInAction, works well with the KEEP Appliance Survey. Teachers and students can input their survey results either individually or by classroom. When making commitments, participants indicate their intent to follow through by entering an estimated implementation date. KEEP staff are able to email participating teachers to remind them (and, by proxy, their students) to return to the site to confirm implementation of their energy-saving commitments. However, it was difficult to get participants to return to the KEEPInAction website to confirm that promised actions had been carried out.

#### **Teacher participation**

Fourteen course participants completed the online Appliance Survey as part of a KEEP's "Energy Education: Concepts and Practices" course assignment, resulting in 37 promises to complete energy-saving actions. Five of the total actions have been completed to-date. The infographic in Figure 4 illustrates teacher participation in the online data collection tool.

#### **Student participation**

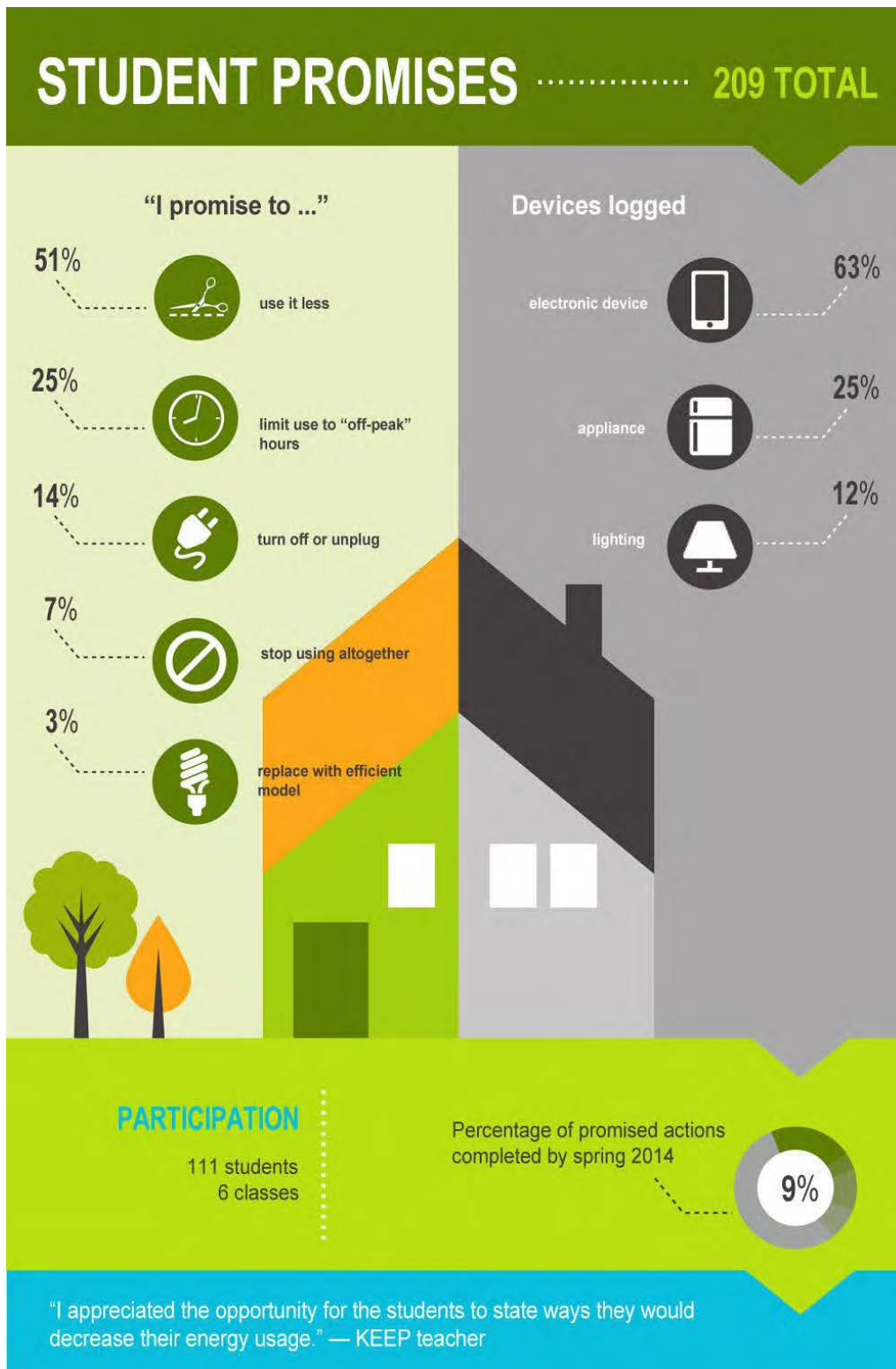
Six classroom teachers participated in piloting the KEEPInAction website/appliance survey during February and March 2014. As a result, a total of 111 students participated, resulting in 209 commitments to energy-saving actions. The infographic in Figure 5 illustrates student participation in the online data collection tool.

Most promises involved reducing the use of appliances, electronics and lighting. Few actions were related to HVAC use. Interestingly enough, many students identified items distributed within all categories that remain powered on when no one is actively using them. This may be an indication of where to focus future conservation education efforts—to items for which influence and usage are within students' realm of control. Also, since few mentioned taking action on making adjustments to HVAC controls, this could be an opportunity to discuss the energy savings potential of thermostat adjustments or control.

Figure 4: Teacher Participation in the Online Data Collection Tool



Figure 5: Student Participation in the Online Data Collection Tool



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## Key Takeaways

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While use of an online data tracking system was tested in a small way with few participants, the results illustrate proof-of-concept: if given the opportunity, teachers and students will use an online data collection tool to track their activities and participation in KEEP activities. The collected data demonstrate the type of information that can be collected using a more robust online data tracking tool with a larger audience of teachers and students and more classes or exercises. As a result, we offer the following future strategies for KEEP program data tracking:

- Develop KEEPinAction website into a robust online portal for comprehensive tracking and reporting
- Add energy savings and data collection questions or activities that encourage “Taking Action” to appropriate KEEP teacher and classroom curricula
- Develop the expectation for teacher and student reporting of results as a KEEP participation norm.

## ENERGY-RELATED BEHAVIOR CHANGE

Offering the Cool Choices game at schools provided an opportunity to gauge the potential that a complementary program offers to supplement KEEP’s energy education with a more action-oriented focus. There were two rounds of the game offered in the spring semester 2014 (January-May) engaging 411 players including teachers, students, facilities and kitchen staff, administration, and parents from 22 schools. Collectively, 411 players reported taking 22,188 actions that save natural resources, increase environmental/ sustainability literacy, save money, increase the safety of the schools, and assist schools in completing their Green and Healthy Schools applications. The actions taken through the game help schools complete their Green and Healthy Schools application by providing demonstrated achievement in nine focus areas, including energy, water, environmental health, health and wellness, recycling and waste management, school site, environmental/sustainability education, transportation, and community involvement.

*Round 1:* As noted above, the first round of the game emphasized actions players could take at home as well as an assortment of school building-based data collection activities associated with Green and Healthy Schools applications. (The latter actions awarded points, but did not in-themselves encourage any energy-saving behaviors or practices that would result in actual kWh or therm savings). This round was played from January 20 through March 16, 2014. Thirty-seven schools had shown interest in playing this round, but only thirteen followed through due to timing conflicts, the lead-time needed to get organized internally, and some illnesses. Also, a number of teachers used this round as an opportunity to test the Cool Choices game prior to playing with their school or class in the future.

*Table 2: Cool Choices Round 1 results* lists the schools and number of players from each for Round 1 of the game. We also show the number of actions reported. As shown, activity varied greatly by school, which points both to the potential for engaging large numbers of players and spurring activity around sustainability (or energy) and also that simply offering the game does not result in participation. Internal champions and excitement are likely pre-requisites for a game to “take off.”

**Table 2: Cool Choices Round 1 results**

School, Location	Utility	# of Players	# of Actions
[REDACTED]	Alliant Energy	6	150
[REDACTED]	MGE	1	4
[REDACTED]	We Energies	4	130
[REDACTED]	We Energies	18	624
[REDACTED]	We Energies	1	2
[REDACTED]	We Energies	79	777
[REDACTED]	We Energies	4	35
[REDACTED]	We Energies	1	14
[REDACTED]	We Energies	1	2
[REDACTED]	WPPI Energy	1	38
[REDACTED]	WPS	1	7
[REDACTED]	WPS	53	6,363
[REDACTED]	Focus Muni	3	17
<b>TOTAL</b>		<b>173</b>	<b>8,163</b>

*Round 2:* The second round of the game included a greater emphasis on impactful actions players could take at school as well as at home. Nine schools participated in the second round of the game, which was held from March 30 to May 30. *Table 3: Cool Choices Round 2 results* lists the schools and number of active players from each for Round 2 of the game.

**Table 3: Cool Choices Round 2 results**

School, Location	Utility	# of Players	# of Actions
[REDACTED]	Alliant Energy	27	529
[REDACTED]	Alliant Energy	56	901
[REDACTED]	MGE	13	148
[REDACTED]	WPPI Energy	36	2,411
[REDACTED]	WPPI Energy	9	1,047
[REDACTED]	WPPI Energy	47	4,619
[REDACTED]	WPPI Energy	1	18
[REDACTED]	WPPI Energy	43	3,985
[REDACTED]	WPS	6	367
<b>TOTAL</b>		<b>238</b>	<b>14,025</b>

*Table 4 Cool Choices Round 2 actions and estimated energy savings*, lists new energy savings actions (actions not performed prior to the Cool Choices game) and the number of times these choices were made during round 2 of the game. We also show the estimated energy impacts from these activities. Note that therms are not shown as only a small amount (58 therms) of natural gas savings resulted from this game. We also had limited opportunity to add energy saving cards to the game, as some energy saving activities we proposed did not fit within the pre-programmed game structure and there was reluctance from Cool Choices to deviate from the planned game structure.

**Table 4: Cool Choices Round 2 actions and estimated energy savings**

<b>New Action</b>	<b>Number Of Times Played</b>	<b>Energy Savings (kWh)</b>
Our school unplugs refrigerators when not in use.	1	89
Our school refrigerators are set to 39 F and the freezers to 5 F.	2	60
At home: Install low-flow showerhead	3	176
I turned my game console off when not in use.	4	16.9
I turned off the computer monitor today when I wasn't using it.	4	1.79
I shortened my shower today by 1-2 minutes.	5	5.23
I turned off the lights when not in use.	5	9.4
I turned off the TV when not in use today.	5	2.18
At home: Replace 85 percent of household incandescent bulbs with CFLs.	8	420
At home: Replace non-LED outdoor landscape lights with solar.	8	175.2
At home: Switch furnace fan setting from continuous to auto.	8	1336
I set my computer to "sleep" after 20 minutes.	10	35.8
I watched 2 hours less TV today and turned it off for those 2 hours.	13	4.37
At home: Remove or unplug your second refrigerator.	16	532

In all, direct energy-related actions—mostly activities done at home—resulted in an estimated annualized impact of about 25,400 kWh and 58 therms. These estimates are based on deemed values computed for Cool Choices actions that were estimated when the game was developed and have been trued up to self-reports from players who participated in early games, on the pre- and post-game conditions when they claimed selected, high-impact actions.

These savings are based on actions such as switching furnace fan settings from continuous to auto, removing or unplugging second refrigerators, and enabling power saver modes. Activities like Cool Choices could be modified to fit an in-school context by promoting more actions players can take at school, as well as those that apply in their home lives. Our savings estimates also do not include

precursors to potentially substantial actions at the school through changes in large-scale occupant practices, policies, and facilities operation and equipment. Savings from some of those actions—if implemented as a result of conversations started during a Cool Choices game or similar program elements—could be substantial.

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## **Key Takeaways**

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Overall, many participants in the Cool Choices game liked the increased awareness and opportunities for learning the game created. A few participants reported they learned new ways to be energy efficient. Many respondents commented that there is room for improvement within their school districts to become more “green.” Participants also commented that the game is a fun way to get both staff and students involved in making better choices both at school and at home.

This pilot effort also demonstrates proof-of-concept in that Cool Choices, a behavioral change game, did encourage members of the school community to make both sustainable and energy-saving choices. The importance of moving energy savings behaviors from the school environment to participants’ social and home fabric, such as challenging others to make choices at home or sharing their choices with others playing the game, was also shown. Cool Choices demonstrates the potential impact that behavioral activities can have on participants’ awareness and behaviors. As a result, we offer the following future strategies for KEEP behavior change activities:

- Build on KEEP teachers’ demonstrated interests in relating energy education to practical, everyday activities to get more behavioral energy savings
- Create connections from energy education in school to home energy savings actions
- Add more recognition activities that promote and celebrate energy efficiency and sustainability actions taken by participants

## **SCHOOL BUILDING PERFORMANCE IMPROVEMENT**

Four Wisconsin schools were selected for an energy efficiency pilot program based upon the following combination of factors: the utility service territory in which the school was located; Green and Healthy Schools Wisconsin participation; and participation in KEEP’s NRES 634 School Building Energy Efficiency Education course. Three elementary schools of roughly the same size, ranging from about 35,000 to 65,000 square feet, were examined. [REDACTED] were constructed in the mid-1950s. [REDACTED] was constructed in 1978. These schools consist of multiple wings that were added over time as the student population grew. One large high school was audited, the [REDACTED] which is 269,000 square feet.



[REDACTED]

The first school assessed was [REDACTED]  
On March 6, 2014 staff from the Energy Center of Wisconsin and KEEP visited the site. KEEP's NRES 634 course targeting the [REDACTED] District was held in April 2014.



East façade of [REDACTED]

[REDACTED]

A portion of the campus of the [REDACTED] district was selected for an assessment. The [REDACTED] which consists of multiple buildings, received a site visit on March 10, 2014. The east building, located at [REDACTED], is German Renaissance Revival style, designed by architect Fred W. Wolf and built in 1886. The west building, located at [REDACTED] [REDACTED] [REDACTED]. The school recently joined the Green and Healthy Schools program. KEEP's NRES 634 course targeting the [REDACTED] district was held in March 2014.



[REDACTED] looking south

[REDACTED]

[REDACTED], part of [REDACTED] district, is located at [REDACTED]. This specialty school operates year-round as an Eco-campus. The school is part of the Green and Healthy Schools program, at the Sprout level. Staff from the Energy Center of Wisconsin visited the site on March 17, 2014. KEEP staff provided teacher professional development for [REDACTED] staff in January, and follow-up site visit took place on May 9, during which the

team participated in a panel discussion by [REDACTED] third and fourth graders reporting their findings resulting from their own energy audit of the school.



South façade of [REDACTED]

[REDACTED]  
The school facility that received the fourth audit is [REDACTED], which is within the School [REDACTED]. It is located at [REDACTED]. Energy Center and KEEP staff visited the site on April 9, 2014.



Primary entrance to [REDACTED]

A majority of proposed measures focused on lighting and lighting controls. All four schools studied had already partially or completely retrofitted T12 lamps to T8s and magnetic ballasts to electronic ballasts in existing fixtures. The single measure that was recommended to all schools was to install occupancy sensors in unoccupied areas such as storage, mechanical, private offices, computer labs, dining areas and break rooms. This is a low-to-medium cost option with a relatively short payback.

The second most frequently recommended measure was daylighting controls, specifically the installation of photosensors on interior and exterior lighting. This is a low-to-medium cost option depending on the

technology selected. Most of the schools studied have a significant amount of glazing, and some schools had an additional level of interior glazing, to bring natural light into the core of the building. In addition to installing controls, the team often recommended the installation of solar shades or window film to control natural light.

Other common measures were delamping lighting fixtures, installing bi-level switching for lighting controls, installing skylights at key intersections in interior hallways, implementing better computer power management controls, adding variable frequency drives on pumps, fans, and air handling units. Installing demand controlled ventilation on air handling equipment was also mentioned for two schools. A couple capital-intensive recommendations were made, such as boiler replacement and overall lighting fixture replacement.

*Table 5: Model Results Summary with estimated energy and financial savings* provides a summary of key measures across all school buildings. It is important to note that it is neither practical nor feasible to achieve the total savings listed. Rather, the intent of the measures list is to provide a range of savings opportunities. Where a capital intensive measure is proposed, an alternate measure or combination of measures is provided to facilitate implementation within a school’s capital constraints. The values are totals of individual measures in order to provide options to assist with future planning and budgets.

**Table 5: Model Results Summary with estimated energy and financial savings.**

<b>KEEP Energy Efficient School Buildings Pilot Energy Model Results Summary</b>					
School Facility	Number of Proposed Measures	Annual kWh Savings	Annual Therm Savings	Annual Energy Cost Savings	Estimated Focus on Energy Incentives**
	7	53,887	5,510	\$8,057	\$5,309
	10	816,510	22,271	\$84,043	\$34,028
	17	168,628	3,728	\$21,993	\$6,320
	14	133,939	5,034	\$18,247	\$11,200
<b>Total</b>	<b>48</b>	<b>1,172,964</b>	<b>36,543</b>	<b>\$132,340</b>	<b>\$56,857</b>

**Notes:**  
 Each ECM is analyzed individually, so savings totals are not cumulative or interactive between measures.  
 \*\* Incentive amounts are estimated by using custom incentive rates due to an undefined scope.  
 Incentives and measure qualifications are subject to change.

## Key Takeaways

From our analysis of a small sample of schools, there appears to be great opportunity for KEEP to pair a formal energy audit with their NRES 634 course. Performing the site visit and speaking with district and facility staff provided insight regarding specific school building needs and the value of providing technical support through KEEP. The audits provide another level of education for teachers, district and school administration, and facilities staff by use of the school building as a teaching tool. Benefits are also seen by other stakeholders in the community, such as local taxpayers affected by the cost of operating public schools. School staff is able to use the reports provided as a reference for planning and as a baseline for tracking of school energy usage. Unfortunately, few schools have funds available to undertake this type of study on their own. During NRES 634, course participants met their district facilities manager, utility representative and local Focus on Energy advisor, who contribute to educating

them on facility energy use, how schools are billed for energy, audit findings and Focus on Energy incentive opportunities. Nearly every recommended measure qualifies for Focus on Energy incentives.

School building audits also expanded energy education opportunities for students. We had the opportunity to participate in a panel discussion at [REDACTED] and listen to the findings from third and fourth graders who conducted their own school “energy audit.” KEEP and Energy Center staff members provided high level audit results to the students, who were excited to discover that some of their recommendations paralleled those of the Energy Center’s engineers.

We offer the following future strategies for KEEP behavior change activities:

- Continue to offer energy audit opportunities in tandem with the NRES 634 courses
- Invest school and district facility staff and energy engineering time and assistance in order to identify schools most in need of services in the district
- Continue partnership with Focus on Energy to foster program linkages and to support and inform estimates of incentives
- Explore opportunities for student involvement, such as student-led audit activities.

## DISCUSSION

KEEP has supported the energy education of Wisconsin’s K-12 teachers; and through teachers, students; for nearly two decades, serving more than 6,000 teachers who have influenced nearly three million Wisconsin students since 1997. Designed to operate using a long-term energy literacy approach, we initiated a three-pronged pilot to determine if the program had the potential to influence energy-related behaviors and assist energy efficiency programs with their achievement of short-term energy savings impacts.

Our pilot added data collection and reporting, energy use behavior change, and school building performance improvement to KEEP’s energy education mission. From our work on the KEEP enhancement pilot, we learned how teachers perceive KEEP and how it can be leveraged to spur near-term energy savings. We demonstrated that program enhancements designed to capture short-term energy savings can be developed for KEEP, and that the program helps to link to other energy savings efforts, which would be difficult to do without the program.

Evidence shows the relationship of KEEP with its teacher network is strong. Teachers are excited about KEEP and support it. Teachers like making the connection of energy to everyday life, and enjoy using KEEP to do so. The program is a valuable resource, providing curriculum, professional development and other resources to teachers. It fills a need for educating teachers and students about energy and energy efficiency.

Some KEEP energy concepts can be linked to everyday life choices related to energy use and energy efficient practices. We tried to further develop the program and its ability to link everyday lives to energy efficiency initiatives by adding more measurement; creating a broader network of teachers, students, families and schools; connecting buildings to technical assistance and Focus on Energy resources; and using KEEP as an entry point to talk about greater building efficiencies.

With its robust network of energy-related resources, topical experts and participants that connect energy efficiency and initiatives to change energy-related behaviors in our daily lives, teachers use what they learn from KEEP courses to enrich students' daily living skills. They infuse activities ranging from human impact on the earth's limited energy resources in science to budgeting money in daily living skills with the wise use of energy.

Social and marketing research has shown that children can wield tremendous influence in the home. With the right activities, KEEP can expand its influence to households and school buildings. By providing exercises that students bring home to complete with parents or complete in the classroom based upon home energy use, KEEP can be used to introduce households to energy efficiency and to Focus on Energy programs and incentives.

Our work also shows that there is a demand by school facility staff for assistance identifying opportunities for energy performance improvement and putting together the documentation to communicate the needs to school stakeholders. Energy Center staff noticed an increase in the level of engagement throughout the audit process if both a staff member from the school facility and a member of the district administration participated. We were able to quantify opportunities for energy-saving building improvements. By enhancing KEEP with technical support, we were able to generate qualified leads for Focus on Energy projects.

The school building audits provided a number of values to schools and school staff. The coordination of the school audit with the NRES 634 class provided an educational opportunity not only for teachers within the district, but also facilities and administration staff. The audit formed the foundation for communication between the individual school and district facility staff in regards to planning to achieve both short and long-term energy savings goals. Administration from two of the schools studied stated that they will present the audit report to their school board to aid in planning the budget for the school. In each of the meetings with the schools, administration staff stated that they intend to implement some of the measures identified; particularly the low-cost/no-cost measures in the coming year. In some cases, administration and facilities staff were aware of the recommended capital improvements, especially those having to do with equipment that is nearing the end of its useful life. Even so, all were appreciative of the report as it serves as validation and support for energy efficiency improvements from an independent third party when going before the school board for funding requests.

In tandem with broad-based energy education, KEEP can influence behavior, as well. Indeed, a subset of the energy lessons provided by KEEP to teachers directly address precursors to energy efficient practices by students, including why energy consumption matters; what its impacts are; how people use energy; and how they can use energy more efficiently. Depending upon the activity, KEEP can be leveraged to drive behavioral change. Even though we cannot track energy savings impacts that result from these lessons, we can track changes in attitude that indicate progress toward behavior change.

We also learned that building a basic system to track the results of educational activities does not require a major investment of resources. While the online data tracking tool requires enhancements to make it more engaging, teachers and students did use the system. It is unclear if incentives or other means of motivation are needed to encourage KEEP participants to enter information into a data tracking system.

While not designed to be an energy efficiency program, KEEP does have the potential to affect the practices of students at home and in the school. Further, engaging teachers in more active teaching of

energy education can affect their energy practices and could potentially lead to energy efficiency upgrades or renewable generation within the school facilities themselves. In that respect, KEEP serves as a “hub” from which there is the potential to further integrate energy and energy efficiency into the K-12 curriculum, the school and the household.

## **IDEAS FOR CONTINUED ENERGY CENTER OF WISCONSIN SUPPORT**

Energy Center staff members have several ideas for continued support of KEEP activities. Ideas include, but are not limited to:

**Continue enhancement and support of the online data collection tool, KEEPInAction.** The Appliance Survey on the KEEPInAction website was envisioned to be the first of several exercises or activities designed to collect data on actions taken in schools and households by teachers and students. As such, website support and development could frame a project for the Energy Center. The Energy Center could purchase the KeepInAction domain in order to provide more flexible website design through third-party hosting. Make reporting results easy, fun and the new norm.

**Update of existing curriculum content to include online activities, videos and webinars.** The Energy Center’s expertise in developing enhancements and adding content to the KEEPInAction website can aid the development of new, engaging online content. This would be a way to engage teachers and students in new or revised content, while expanding the program’s reach to Wisconsin’s teachers and students cost-effectively.

**Provide additional resources for curriculum development.** Energy Center curriculum development and training expertise is available to assist with the development of new exercises related to energy efficiency. Energy Center staff members can also assist with the integration of the online tracking system into appropriate lessons and developing training for system use in a teacher professional development class.

**Develop evaluation tools.** The Energy Center has a number of staff members who are experienced in the evaluation of traditional energy efficiency programs and in behavioral programs. This expertise could be used to develop program evaluation tools for ongoing use by KEEP. Energy Center staff could design evaluation tools to collect program effectiveness, energy savings or energy literacy impact data.

There are some survey tools already in existence for use with students (for example the energy literacy survey tools prepared by the Clarkson University Energy Literacy Assessment Project). However, we suggest the development of knowledge and behavior-related questions that are in alignment with KEEP curriculum to allow specific evaluation of Wisconsin activities. The survey tools could be focused to students and teachers of particular grades and could be offered to students to determine changes in energy literacy. This effort would likely require coordination with existing testing standards and a comparison group of non-KEEP students.

**Continue school building activities, including identification of opportunities for improvement, performance modeling and assistance identifying available incentives.** Demand was high for building energy assessments. Often, facility staff members requested additional audits for other schools in their districts. The Energy Center has the engineering and analysis capability to identify opportunities for energy savings, address technical questions and provide support evaluating vendor-proposed

improvements. Our staff members also have experience communicating results to stakeholders and linking projects to Focus on Energy staff and programs.

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## APPENDIX 1

### **KEEP MISSION**

KEEP is the product of an innovative public private partnership between educators and energy professionals including Wisconsin's major utilities. The University of Wisconsin-Stevens Point's Wisconsin Center for Environmental Education - a center of the College of Natural Resources and UW Extension — Cooperative Extension - launched this effort in 1995.

#### Mission

The mission of KEEP is to initiate and facilitate the development, dissemination, implementation, and evaluation of energy education programs within Wisconsin schools. The goal of the Program is to leverage teacher education to improve and increase energy literacy in Wisconsin's K-12 schools as a means of contributing to statewide energy savings. The Program's vision is to be nationally recognized for creating an energy literate citizenry in Wisconsin actively engaged in energy conservation, efficiency, and renewable energy initiatives.

The need for energy education is clear when we understand that some households spend more than 20 percent of their budget on heating their homes and fueling cars. Energy issues in the news emphasize the importance of energy education. Our society needs individuals with the knowledge, skills, and attitudes that will allow them to use energy resources wisely. Energy literacy is critical to Wisconsin's economic and environmental future.

Energy education must be an integral part of the school curriculum to produce energy literate citizens. The Wisconsin Department of Public Instruction recognizes the need for energy education. Their Academic Science Standards include many objectives related to energy concepts. To address these standards and improve students' energy literacy teachers need more education and resources to be able to incorporate energy into their lessons.

With KEEP, Wisconsin now has the appropriate frameworks and support systems for a sequential and comprehensive approach to energy education in schools.



## APPENDIX 2

### KEEP ACCOMPLISHMENTS

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#### Professional Development Opportunities

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More than 4,450 individual teachers have participated in a graduate-level KEEP course through the University of Wisconsin-Stevens Point since 1997. Many of them have taken multiple courses reaching a total of 6,000 total KEEP course participants. There are more than 330 teachers who have taken three or more KEEP courses, reaching “KEEPtacular” status. Courses are taught by a unique network of ad hoc instructors who hold courses throughout the state and online.

- **Energy Education in the Classroom:** This introductory energy education course has served more than 3,139 Wisconsin educators who have received hands-on experience teaching lessons from the *Energy Education Activity Guide* and *Student Book* they receive. Participating in a KEEP course increases teachers’ energy literacy and increases the likelihood that they will integrate energy education into their lessons. Through the teachers who have participated in this course, there is a potential of reaching over 3,000,000 Wisconsin students.
- **Web-based energy literacy courses:** More than 519 teachers have participated in energy education courses through KEEP via the Internet; the content of these interactive courses (one on energy concepts and misconceptions, and a second on renewable energy concepts and applications) are available at reduced costs to teachers year-round via the KEEP website and are offered for credit several times during the year making information about energy more conveniently located and easily accessible.
- **Renewable Energy Education in the Classroom:** More than 805 teachers have participated in this course that helps teachers gain an understanding of renewable energy concepts and build on the activities and experiences provided through other KEEP courses. Participants receive a copy of the supplemental guide, *Doable Renewables*, and gain firsthand experience in renewable energy through fieldtrips and guest speaker presentations.
- **School Building Energy Efficiency Education:** More than 722 teachers have participated in this course where teachers collaborate with their district administrators, facility managers, representatives from their Utility, and with consultants from Focus on Energy to investigate how their school uses energy and can save money and energy through energy efficiency. Course participants conduct an informal energy audit of their building and develop an action plan they can use with their students to help reduce their school’s energy costs. Participants receive a copy of the supplemental guide, *Energy and Your School*.
- **Special Topics in Energy Education:** KEEP offers a variety of special topics that focus on specific events and/or technologies; these courses are most likely outcomes of teacher requests. Special topics courses include Exploring Renewable Energy at the Energy Fair, Exploring Building Science Technologies at the Better Buildings: Better Business Conference, Exploring Energy Education through STEM, Wind Energy Education, and Biomass Energy Education. More than 826 teachers have participated in special topics courses.

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## Student Involvement Opportunities

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- **Bright Idea Fundraiser:** Through this activity that was offered from 2004-2011, students learned about energy efficiency and conservation while raising needed funds for various school resources and projects. Each year, thousands of Compact Fluorescent Light bulbs and LED holiday lights were sold preventing millions of pounds of carbon dioxide emissions from being released into Wisconsin's atmosphere. The program was discontinued after it was deemed a success due to market saturation/transformation.
- **Annual Bookmark Contest:** For eleven years, students in 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> grade participated in KEEP's annual bookmark contest in which they entered artwork that illustrated an energy theme. Three winners from each grade were chosen each year to have their artwork published on bookmarks that were distributed throughout the state.
- **Student-Built Homes Support Program:** By working closely with technology education instructors across the state, KEEP helped integrate energy efficiency into the design and construction of homes which labeled many of the homes as Wisconsin ENERGY STAR Homes or Wisconsin New Homes.
- **Electrathon:** For four years, KEEP coordinated the Wisconsin Electrathon program which provides a means of teaching how to evaluate alternatives and make sustainable lifestyle choices, and uses a problem-solving discipline to design and build an efficient vehicle, all in a hands-on and team oriented approach. KEEP continues to support the Electrathon and Supermileage programs.

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## Curriculum

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- **A Conceptual Guide to K-12 Energy Education in Wisconsin:** Identifies important energy concepts that students should know and understand.
- **KEEP Activity Guide:** Contains 44 hands-on, interdisciplinary lessons that make energy relevant to students' lives and are aligned with Wisconsin's academic standards, Next Generation Science Standards, and Common Core Standards.
- **Doable Renewables:** This guide provides teachers with interactive lessons on renewable energy education they can share with students.
- **Energy and Your School:** This guide provides teachers with interactive lessons that involve using the school building as a teaching tool.
- **BioFutures:** This guide provides teachers with hands on lesson on biomass energy topics.

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## Hands-on Resources

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- Energy Education Resource Trunk, Hand-crank Generator, Pedal Power, Watt Meters, Sun Oven, Light Meter, Infrared Thermometer

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## Networking and Outreach

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- **KEEP On Going:** KEEP provides continued support for teachers through an online newsletter, website, and at conferences.
- **KEEP Connected:** The KEEP website, [www.uwsp.edu/keep](http://www.uwsp.edu/keep), continues to be enhanced and updated to provide teachers with the latest resources and links to energy education teaching ideas and support networks.
- **Awards Recognition:** Each year, KEEP recognizes Energy Educators of the Year at the Wisconsin Association for Environmental Education (WAE) Awards Banquet.
- **Energy Education Certificate through UW-Stevens Point:** Available to practicing K-12 teachers, the certificate enhances the teaching portfolio and to verifies professional development in energy education.
- **Educator Tents at the Energy Fair:** WCEE staff host the Educator Tents at the annual Energy Fair which include workshops and graduate credit opportunities for teachers to gain leadership skills in promoting renewable energy in their school and community. This outreach event serves the greater Wisconsin community by educating them about renewable energy and energy opportunities for teachers and students.
- **Partnerships in Energy Education:** Working collaboratively with Wisconsin utilities and energy resource professionals, KEEP promotes energy literacy in homes, schools, and communities.

## APPENDIX 3

### QUOTES FROM KEEP PILOT PARTICIPANTS

Following are quotes from teachers in response to using the online Appliance Survey:

- “I thought the appliance survey was very simple and user-friendly. I appreciated having the links to information about watts, conversions to kWh, leaking electricity charts, etc. I would not have known this information otherwise, and found these charts to be very useful references.”
- “I appreciated the opportunity for the students to state ways they would decrease their energy usage. As part of Daily Living Activities, we often talk about our impact on the earth's limited number of resources and climate change. This winter offered an excellent real world experience of the changes that are due to some human activities and why we need to change them.”
- “A parent emailed that she loved doing it (the paper version of the appliance survey) with her child!” (Once the students filled out the paper version at home, they worked in class to fill out the answers online.)
- “I usually don't do much with energy--except when we talk about the cost of utilities in their budgeting unit. I felt as though this pilot encouraged me to seek out some resources that I typically wouldn't have.”

Following are quotes from teachers in response to participating in Cool Choices through KEEP:

- “The Cool Choices game has definitely raised staff awareness on how they can contribute to sustainability and the conservation of resources at work, but the game has also led to people talking to others and sharing ideas on how our districts policy and choices contribute to becoming a Green and Healthy School. The competition is awesome-we all look forward to playing our cards each day.”
- “This game has become a bit of a scavenger hunt for the independent players, as they are finding that they don't actually know the answers to every card. This has forced them to seek out clarity regarding our schools policies and inquire to others in our learning community for answers about how and why (or why not) the school has sustainability practices in place.”

Following are several quotes from teachers in response to the NRES 634 School Building Energy Efficiency Education course:

- As a result of KEEP's “NRES 634 School Building Energy Efficiency Education” course I have a new awareness of how much energy is used in my classroom, building and school district, so much that I have modified my classroom practices to reflect energy saving behaviors. Having learned how to calculate the cost of energy use per kilowatt hour (kWh) has encouraged me to reflect on some of my wasteful energy practices, such as leaving my classroom lights on when unoccupied, allowing unused appliances to remain in a charging state for prolong periods of time, and using excessive lighting in lieu of opening blinds and curtains during daylight hours.

Having had the opportunity to create an “Energy Action Plan” has helped me to focus on energy saving practices, as well as encourage my students and peers to participate in energy saving behaviors.

- Despite working in an “Energy Star Leader” building, I am excited to implement future action plans with my students so to continue to complement the ongoing efforts at South Milwaukee High School to effectively manage and reduce overall building energy costs. Within the next school year, I would like to implement my “Energy Action Plan” at the building level, so to create opportunities to maximize the energy savings for or all of our building’s computer charging stations and workstations.

I anticipate involving students from all of my Physical Science classes to conduct energy audits of our school building, as well as research and implement solutions to energy related problems. The correlation to the topic of energy efficiency directly aligns with the Physical Science curriculum. Thus, the real world application of energy conservation is engaging and purposeful for student learning. I also look forward to participating in future KEEP courses through the University of Wisconsin Stevens Point and to continually learning about energy saving practices and activities for my classroom.

- This class was of great importance as it instilled some urgency and motivation as it relates to my personal energy consumption. The result of this increased awareness resulted in energy savings which translates to money saved. I have begun to implement changes in my residence. The major one being that I purchased LED bulbs in my most frequently used lights. I have begun to unplug non-essential items when they are not in use. Additionally, as someone who has electric heat I have turned down the thermostat by a few degrees and turned it off when I am not home.
- Looking forward I am eagerly waiting to see the positive results of my efforts on my electric bill. There was some initial success from the changes I made with the thermostat. Next month I will see the changes from swapping out incandescent bulbs and replacing them with LED bulbs. In addition I have had conversations with family and friends about energy usage and sent a few people to the Focus on Energy Website. Thank you for such a wonderful experience. This has been a very worthwhile endeavor and I am grateful to the KEEP staff for the opportunity.
- I have considered myself to be a fairly energy-conscious individual before taking this class. I make sure to turn off lights when I’m not using them, I have a programmable thermostat in each level of our tri-level house, and I keep the water heater set to a reasonable temperature. Having been through the class, I see how much more I can do to save energy. My home computer is now turned off at night. I have purchased the low-wattage light bulb packs from Costco. I have signed up for an energy audit from We Energies. More importantly, thanks to the class I have some data to show my husband to sway his energy habits. I was able to use the energy meter to show how leaving a T.V. on wastes energy and money. I am now aware of the rebate and grant money available for those who make smarter choices in the purchase of appliances. My children are quick to pick up my new habits, which hopefully will start to show up on our bill, but also makes me happy to think of the magnification of responsible energy consumption.

APPENDIX 4

**KEEP ALUMNI SURVEY**

**Q1 What grade(s) do you teach?** (choose all that apply)

- K
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- retired
- other (please specify): \_\_\_\_\_
- I no longer teach.

**Q2 Where do you teach?** (If not applicable, please enter: N/A)

School name: \_\_\_\_\_

City: \_\_\_\_\_

**Q3 What subject area(s) do you teach?** (If you are an elementary school teacher and teach a variety of subjects please write: Elementary)

\_\_\_\_\_

**Q4 Please indicate the extent to which you agree or disagree with each of these statements.  
As a result of my participation in the KEEP course(s), I am comfortable with:**

	strongly disagree (1)	disagree (2)	neutral (3)	agree (4)	strongly agree (5)
the amount of knowledge I have to teach about energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
my ability to integrate energy concepts into my curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q5 Please use the space below to provide further descriptions or evidence that support your responses to the previous question.**

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**Q6 Please indicate the extent to which you agree or disagree with each of these statements. The KEEP course(s) has/have improved my ability to:**

	strongly disagree (1)	disagree (2)	neutral (3)	agree (4)	strongly agree (5)
increase student knowledge about energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
help students understand energy flow through systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase student knowledge about the development of energy resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
increase student knowledge of renewable energy resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
help students understand the positive and negative effects of energy resource development and use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



help students understand Wisconsin energy issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
affect student attitudes toward energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
encourage students to use energy more efficiently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
help students understand future energy resource development and use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q7 Please use the space below to provide further descriptions or evidence that support your responses to the previous question.**

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**Q8 Since completing the KEEP course(s), what energy saving actions have you incorporated into your classroom?**

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**Q9 Since completing the KEEP course(s), what energy saving actions have you incorporated into your personal life?**

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**Q10 How important was the tuition scholarship in your ability to participate in the course(s)?**

- Not at all Important
- Unimportant
- Neither Important nor Unimportant
- Important
- Extremely Important
- N/A

**Q11 How likely are you to participate in future KEEP course offerings?**

- Very Unlikely
- Unlikely
- Undecided
- Likely
- Very Likely
- N/A

**Q12 What other comments do you have to share on the KEEP course(s) you have completed?**

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Thank you for completing this survey! Your responses will help KEEP shape future courses.

APPENDIX 5

**KEEP SCHOOL ENERGY ASSESSMENT PROCESS**

