BLACK HILLS ENERGY LIVINGWISE®
PROGRAM SUMMARY REPORT
SOUTH DAKOTA SERVICE AREA

2019-2020

SUBMITTED BY:

FRANKLIN ENERGY

Black Hills Energy LivingWise® Program Summary Report South Dakota Service Area 2019-2020

Made possible by:

Black Hills Energy™

Submitted by:

FRANKLIN ENERGY

September 2020

"The students couldn't believe they got to keep everything in the LivingWise Kit."

Nancy Mulcahy, Teacher
Hot Springs Elementary

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"The students liked installing the items and working with their parents."

Koreen Hammel, Teacher
Hot Springs Elementary

Executive Summary

Franklin Energy is pleased to present this Program Summary Report to Black Hills Energy, which summarizes the 2019-2020 Black Hills Energy LivingWise® Program. The program was implemented in the Black Hills Energy service area in the state of South Dakota by 1,035 teachers, students, and their families. Funding was provided by Black Hills Energy.

The following pages provide an overview of the program and materials, outline of program implementation, introduction to the program team, description of program enhancements, impact of the program, and summary of results from the home activities. In addition to this information, evaluations, letters, and comments are provided for a glimpse into actual participant feedback. Lastly, projected savings from the individual measures found within the LivingWise Kit are also included.

Participant Satisfaction

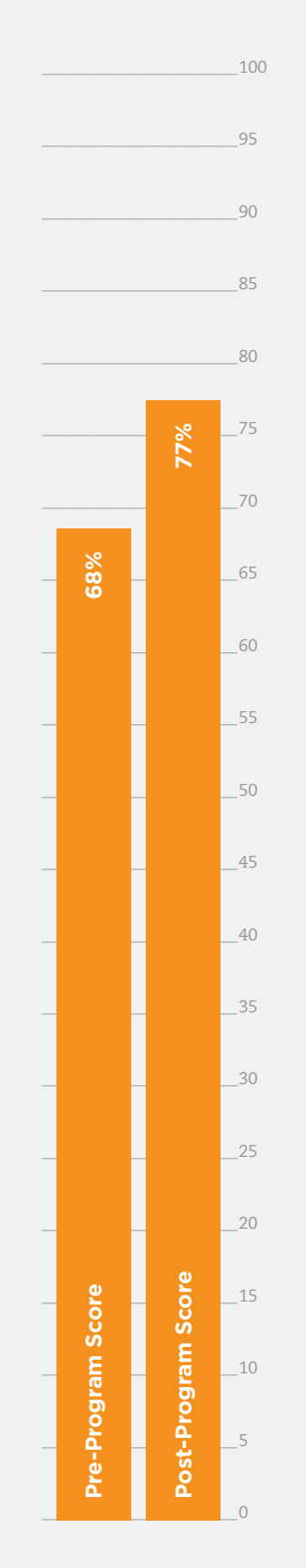
A successful program excites and engages participants. Students, parents, and teachers are asked to evaluate the program and provide personal comments. A sample of the feedback is given in the margin. ›

Teachers who indicated parents supported the program.

Teachers who indicated they would recommend this program to other colleagues.

Teachers who indicated they would conduct this program again.

A summary of responses can be found in Appendix D.



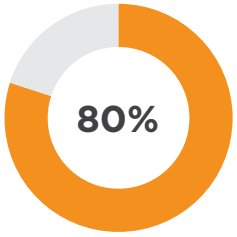
Knowledge Gained

Identical tests were administered to the students prior to the program and again upon program completion to measure knowledge gained. Scores and subject knowledge improved from **68%** to **77%**.

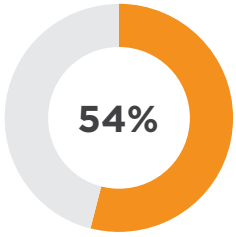
Data Obtained

Home surveys were taken by students and their families, which collected household demographic and consumption data along with program participation information.

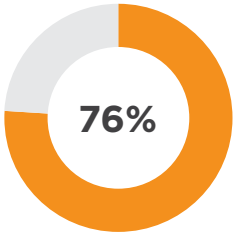
A summary of responses can be found in Appendix B.



Students who indicated that their family homes were owned.



Students who reported that their water is heated by gas.

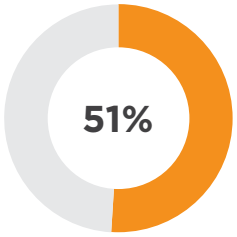


Students who reported that their home has a dishwasher.

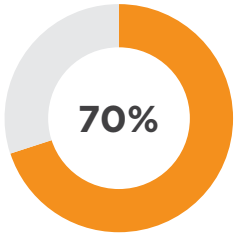
Measures Installed

Students completed take-home activities as part of the program and reported on the kit measures they installed in their homes.

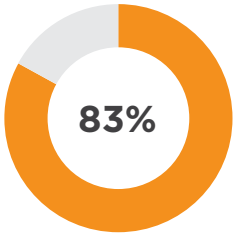
A summary of responses can be found in Appendix B.



Students who reported they installed the High-Efficiency Showerhead.



Students who reported they installed the LED Light Bulb.



Students who reported they installed the LED Night Light.

Energy and Water Savings Results

In addition to educating students and their parents, a primary program goal is to generate cost-effective energy and water savings. Student home surveys not only provided the data used in the savings projections, but also reinforced the learning benefits.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

PROJECTED ANNUAL SAVINGS	
2,734,201	gallons of water saved
201,727	kWh of electricity saved
8,430	therms of gas saved
2,734,201	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS	
21,867,924	gallons of water saved
1,805,338	kWh of electricity saved
72,225	therms of gas saved
21,867,924	gallons of wastewater saved

PROJECTED ANNUAL SAVINGS PER HOME	
2,642	gallons of water saved
195	kWh of electricity saved
8	therms of gas saved
2,642	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS PER HOME	
21,128	gallons of water saved
1,744	kWh of electricity saved
70	therms of gas saved
21,128	gallons of wastewater saved

"Franklin Energy utilizes an extensive network of educators for program feedback. This feedback ensures that educational components meet the changing needs of educators, keep information relevant to students, and provide increased energy literacy for program participants."

Program Overview

The Black Hills Energy LivingWise® Program, a school-based energy efficiency education program, is designed to generate immediate and long-term resource savings by bringing interactive, real-world education home to students and their families. The 2019-2020 program was taught in 5th grade throughout the Black Hills Energy service area in the state of South Dakota.

The Black Hills Energy LivingWise Program team identifies and enrolls students and teachers within the designated service area. The program physically begins with classroom discussions using a Student Guide that provides the foundations of using energy and water efficiently. It is followed by hands-on, creative, problem-solving activities led by the classroom teacher.

All program materials support state and national academic standards to allow the program to fit easily into a teacher's existing curriculum and requirements. The participating classroom teachers follow the Teacher Book and lesson plan. Information is given to guide lessons throughout the program in order to satisfy each student's individual needs, whether they are visual, auditory, or kinesthetic learners.

The LivingWise Kit and Student Workbook comprise the take-home portion of the program. Students receive a kit containing high-efficiency measures they use to install within their homes. With the help of their parents/guardians, students install the kit measures and complete a home survey. The act of installing and monitoring new energy efficiency devices in their homes allows students to put their learning into practice. Here, participants and their parents/guardians realize actual water and energy savings within their home, benefitting two generations.

A critical element of Franklin Energy program design is the use of new knowledge through reporting. At the end of the program, the Black Hills Energy program team tabulates all participant responses—including home survey information, teacher responses, student letters, and parent feedback—and generates this Program Summary Report.

"For more than 27 years, Franklin Energy has designed and implemented Measure-Based Education® programs. The programs inspire change in household energy and water use habits while delivering significant and measurable resource savings."

Program Materials

Each participant in the Black Hills Energy LivingWise® Program receives classroom materials and energy efficiency kits containing high-efficiency measures to perform the program's take-home activities. Program materials for students, parents/guardians, and teachers are outlined below.

Each Student & Teacher Receives

Student Guide

Student Workbook

Parent Letter/Pledge Form*

Student Survey Form

Certificate of Achievement

LivingWise Kit Containing:

- High-Efficiency Showerhead*
- LED Light Bulb
- Kitchen Faucet Aerator*
- Digital Thermometer*
- FilterTone® Alarm*
- LED Night Light
- Flow Rate Test Bag
- Natural Resource Fact Chart
- Toilet Leak Detector Tablets
- Mini Tape Measure
- Parent/Guardian Program Evaluation
- Quick Start Guide*
- Installation Instruction Booklet*

"GetWise" Wristband

Program Website Access at Getwise.org

Toll-Free HELP Line

Each Teacher/Classroom Receives

Teacher Book

Step-by-Step Program Checklist

Lesson Plans

South Dakota State and National Academic Standards Chart

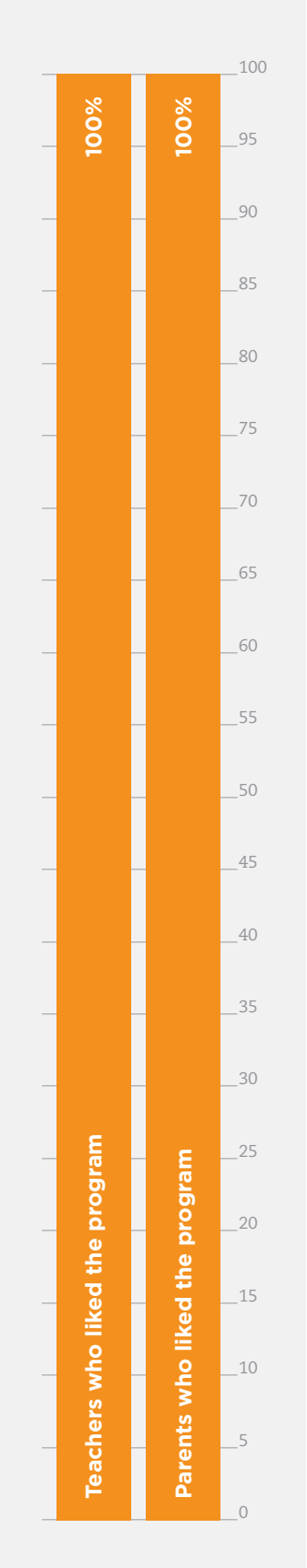
Teacher Survey Form

Pre/Post Student Survey Answer Keys

Electricity, Water, and Natural Gas Posters

Self-Addressed Postage-Paid Envelope

** Materials / Installation Instructions provided in English and Spanish*

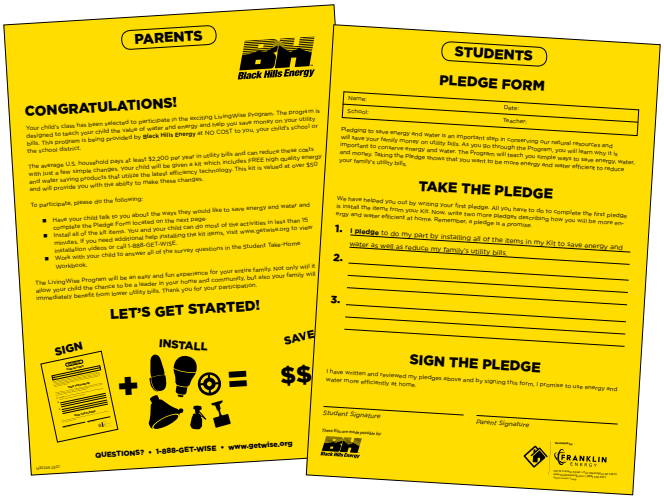


Custom Branding

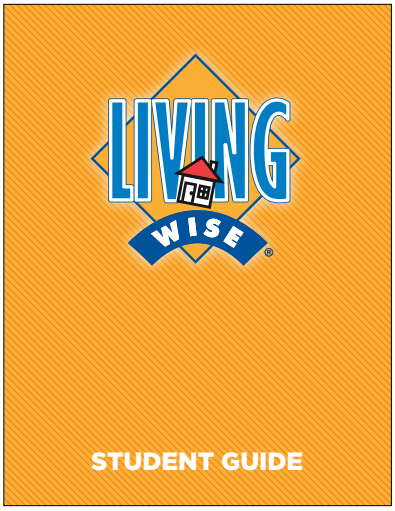
In addition to increasing resource awareness and efficiency, the program has been designed to strengthen bonds between Black Hills Energy and the community. One of the steps taken to ensure the greatest possible exposure is to feature the Black Hills Energy logo throughout each LivingWise Kit. In addition to the kit, the Teacher Survey Form and Parent Letter/Pledge Form also feature Black Hills Energy branding.

Program Materials

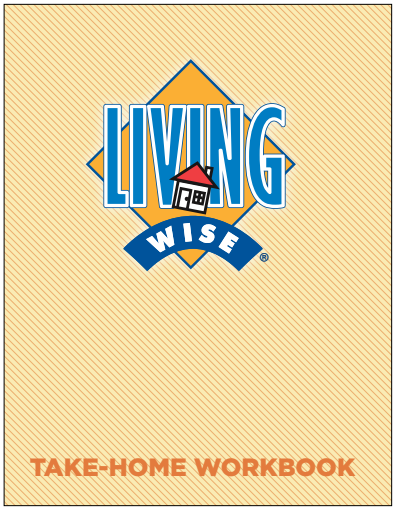
Teacher Survey Form



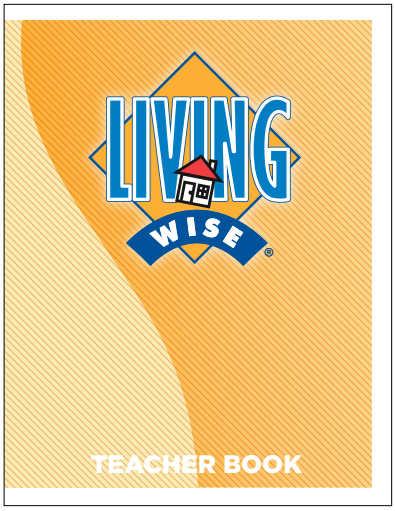
Parent Letter/Pledge Form



Student Guide



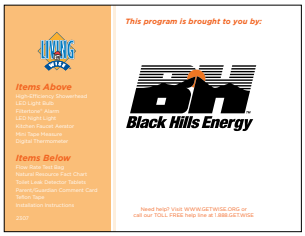
Student Workbook



Teacher Book

Certificate of Achievement

Kit Box



Kit Label

"The program has a teacher friendly curriculum!"

Colleen Clapper, Teacher
Hill City Elementary School

Program Implementation

The 2019-2020 Black Hills Energy LivingWise® Program followed this comprehensive implementation schedule:

1. Identification of South Dakota state and national academic standards & benchmarks
2. Curriculum development and refinement (completed annually)
3. Curriculum correlation to South Dakota state and national academic standards & benchmarks
4. Materials modification to incorporate Black Hills Energy and Black Hills Energy's branding
5. Incentive program development
6. Teacher/school identification—with Black Hills Energy and Black Hills Energy's approval
7. Teacher outreach and program introduction
8. Teachers enrolled in the program individually
9. Implementation dates scheduled with teachers
10. Program material delivered to coincide with desired implementation date
11. Delivery confirmation
12. Periodic contact to ensure implementation and teacher satisfaction
13. Program completion incentive offered
14. Results collection
15. Program completion incentive delivered to qualifying teachers
16. Thank you cards sent to participating teachers
17. Data analysis
18. Program Summary Report generated and distributed

Participating teachers are free to implement the program to coincide with their lesson plans and class schedules. Appendix C provides a comprehensive list of classrooms in grade 5 that participated during the 2019-2020 school year.

Franklin Energy has been in the business of designing and implementing energy and water efficiency programs for nearly three decades. Throughout this time we've built an expert team of industry professionals that deliver a seamless program to achieve your goals.

We designed the Black Hills Energy LivingWise® Program in our program center from the ground up. Working in conjunction with Black Hills Energy, we identified goals, desired outcomes of the program, and specific materials' customization. The result is a stimulating program that delivers significant and measurable resource savings. The Black Hills Energy LivingWise Program features a proven blend of innovative education, comprehensive implementation services, and hands-on activities to put efficiency knowledge to work in homes throughout the Black Hills Energy service territory.

The Black Hills Energy LivingWise Program is a reflection of true teamwork. On behalf of the entire implementation team at Franklin Energy, I would like to thank you for the opportunity to design and implement the Black Hills Energy LivingWise Program. It has been a pleasure working with you. I look forward to many more years of program success.

Sincerely,

Chase Griswold
Program Manager, CAPM®

Program Team

Program Team

The success of the Black Hills Energy LivingWise® Program is owed to a cross-functional implementation team chosen specifically to meet the goals of the program. We incorporated both a PMP® certified Program Manager and a CEM® designated energy analyst to ensure the program hits key milestones and delivers results. These thought leaders are supported by an integral mix of specialists working in unity to accomplish your program objectives. The Black Hills Energy LivingWise Program implementation team consisted of the following:

Outreach

Our outreach team is the face of the Black Hills Energy LivingWise Program, introducing teachers to the program, and providing support throughout implementation to guarantee the program's success in the classroom. This group builds relationships and keeps teachers engaged in program execution year after year.

Graphic Design and Marketing

Expertly-designed kits and program materials are a result of our Graphic Design and Marketing teams. This group provides brand alignment and marketing strategies to ensure program branding is within guidelines. Additionally, this team facilitates copy and art direction and works with education to develop end-user activities.

Education

Led by a Ph.D. educator having both classroom and administration leadership experience, this team is responsible for the development of educational content as well as classroom energy literacy and engagement. The group also ensures the program's content is aligned with South Dakota state expectations in science, math, and language as well as the rigorous expectations of STEM (Science, Technology, Engineering, and Math).

Information Technology

We leave IT strategy and cyber security in the hands of our experts. This team built and manages the integrated systems responsible for seamlessly blending operations, driving automation, and maximizing participation in the Black Hills Energy LivingWise Program. This group provides the managed data services and software in support of outreach, enrollment, order processing, fulfillment, data collection and reporting.

Warehouse and Logistics

Last but not least, our warehouse and logistics teams guarantee Black Hills Energy LivingWise program materials reach the classroom on-time and without errors. This group provides printing, purchasing, production, quality assurance & control, warehousing and shipping for all program materials. Additionally, this team ensures that all materials are consistent with orders and confirms delivery.

"Upon completion of the program, participating families are asked to complete a home survey to assess their resource use, verify product installation, provide demographic information, and measure participation rates."

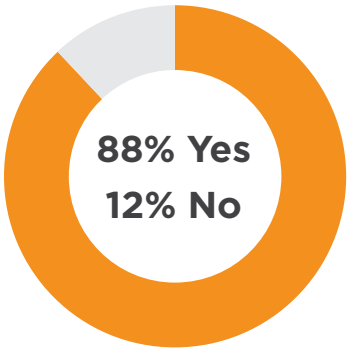
Program Impact

The Black Hills Energy LivingWise® Program has had a significant impact within the community. As illustrated below, the program successfully educated participants about energy and water efficiency while generating resource savings through the installation of efficiency measures in homes. Home survey information was collected to track projected savings and provide household consumption and demographic data. Program evaluations and comments were collected from teachers, students, and parents.

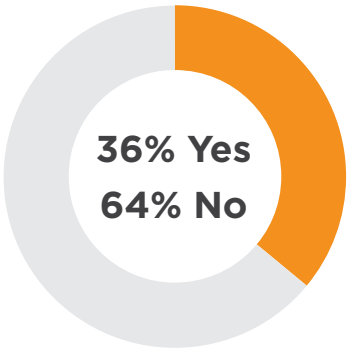
A. Home Survey

Upon completion of the program, participating families are asked to complete a home survey to assess their resource use, verify product installation, provide demographic information and measure participation rates. A few samples of questions asked are below while a complete summary of all responses is included in the appendices.

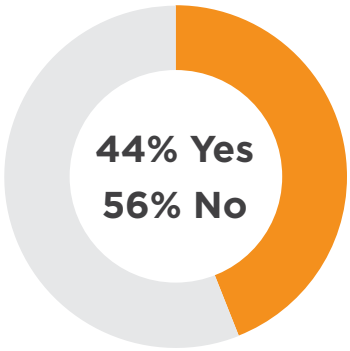
Did you work with your family on this program? **Yes - 88%**
Did your family change the way they use water? **Yes - 36%**
Did your family change the way they use energy? **Yes - 44%**



Students who indicated they worked with their family on this program.



Students who indicated their family changed the way they use water.

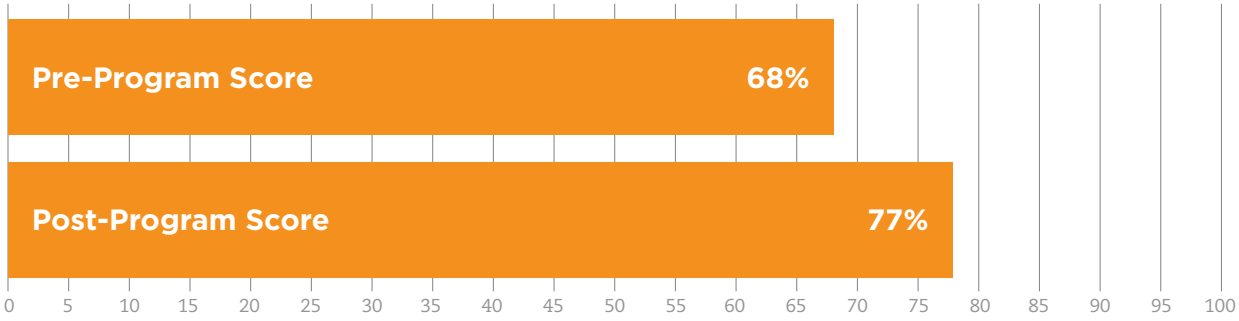


Students who indicated their family changed the way they use energy.

B. Pre-Program and Post-Program Tests

Students were asked to complete a 10-question test before the program was introduced and then again after it was completed to determine the knowledge gained through the program. The average student answered **6.8** questions correctly prior to being involved in the program and then improved to answer **7.7** questions correctly following participation.

Scores improved from 68% to 77%.



C. Home Activities

As part of the program, parents and students installed resource efficiency measures in their homes. They also measured the pre-existing devices to calculate savings that they generated. Using the family habits collected from the home survey as the basis for this calculation, 1,035 households are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Number of Participants:	**1,035**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**1,639,384**	**16,393,843**	gallons
Product Life: **10 years**	**99,861**	**998,613**	kWh
	5,778	**57,777**	therms
Projected reduction from Kitchen Faucet Aerator retrofit:	**926,641**	**4,633,206**	gallons
Product Life: **5 years**	**40,772**	**203,862**	kWh
	2,415	**12,077**	therms
Toilet Leak Repair projects an annual reduction of:	**168,175**	**840,875**	gallons/ year
Product Life: **5 years**			
Projected reduction from LED Lightbulb retrofit:	**32,270**	**314,631**	kWh
Product Life: **20 years**			
Projected reduction from LED Night Light retrofit:	**24,555**	**245,554**	kWh
Product Life: **10,000 hours**			
Projected reduction from FilterTone® installation:	**4,268**	**42,678**	kWh
Product Life: **10 years**	**237**	**2,371**	therms
TOTAL PROGRAM SAVINGS:	**2,734,201**	**21,867,924**	gallons
	201,727	**1,805,338**	kWh
	8,430	**72,225**	therms
TOTAL PROGRAM SAVINGS PER HOUSEHOLD:	**2,642**	**21,128**	gallons
	195	**1,744**	kWh
	8	**70**	therms

D. Teacher Program Evaluation

Program improvements are based on participant feedback received. One of the types of feedback obtained is from participating teachers via a Teacher Program Evaluation Form. They are asked to evaluate relevant aspects of the program and each response is reviewed for pertinent information. The following is feedback from the Teacher Program Evaluation for the Black Hills Energy LivingWise Program.

Teacher Response

(A summary of responses can be found in Appendix D)

100% of participating teachers indicated they would conduct the program again given the opportunity.

100% of participating teachers indicated they would recommend the program to their colleagues.

"The students liked installing the items and working with their parents."
Koreen Hammel, Hot Springs Elementary

"The students couldn't believe they got to keep everything in the LivingWise Kit."
Nancy Mulcahy, Hot Springs Elementary

"The kits were the student's favorite part of the program."
Colleen Clapper, Hill City Elementary School

What did you like best about the program?

"The take-home kit. The families loved it."
Koreen Hammel, Hot Springs Elementary

"The program is well laid out and easy to follow."
Nancy Mulcahy, Hot Springs Elementary

"The program has a teacher friendly curriculum!"
Colleen Clapper, Hill City Elementary School

E. Parent/Guardian Program Evaluation

Parent involvement with program activities and their children is of paramount interest to both utilities and teachers in the program. When parents take an active role in their child's education it helps the schools and strengthens the educational process considerably. When students successfully engage their families in retrofit, installation, and home energy efficiency projects, efficiency messages are powerfully delivered to two generations in the same household. The program is a catalyst for this family interaction, which is demonstrated by feedback from Parent/Guardian Program Evaluations in each program. The following is feedback from the Parent/Guardian Program Evaluations for the Black Hills Energy LivingWise Program.

Parent Response

(A summary of responses can be found in Appendix E)

100% of participating parents indicated that the program was easy to use.

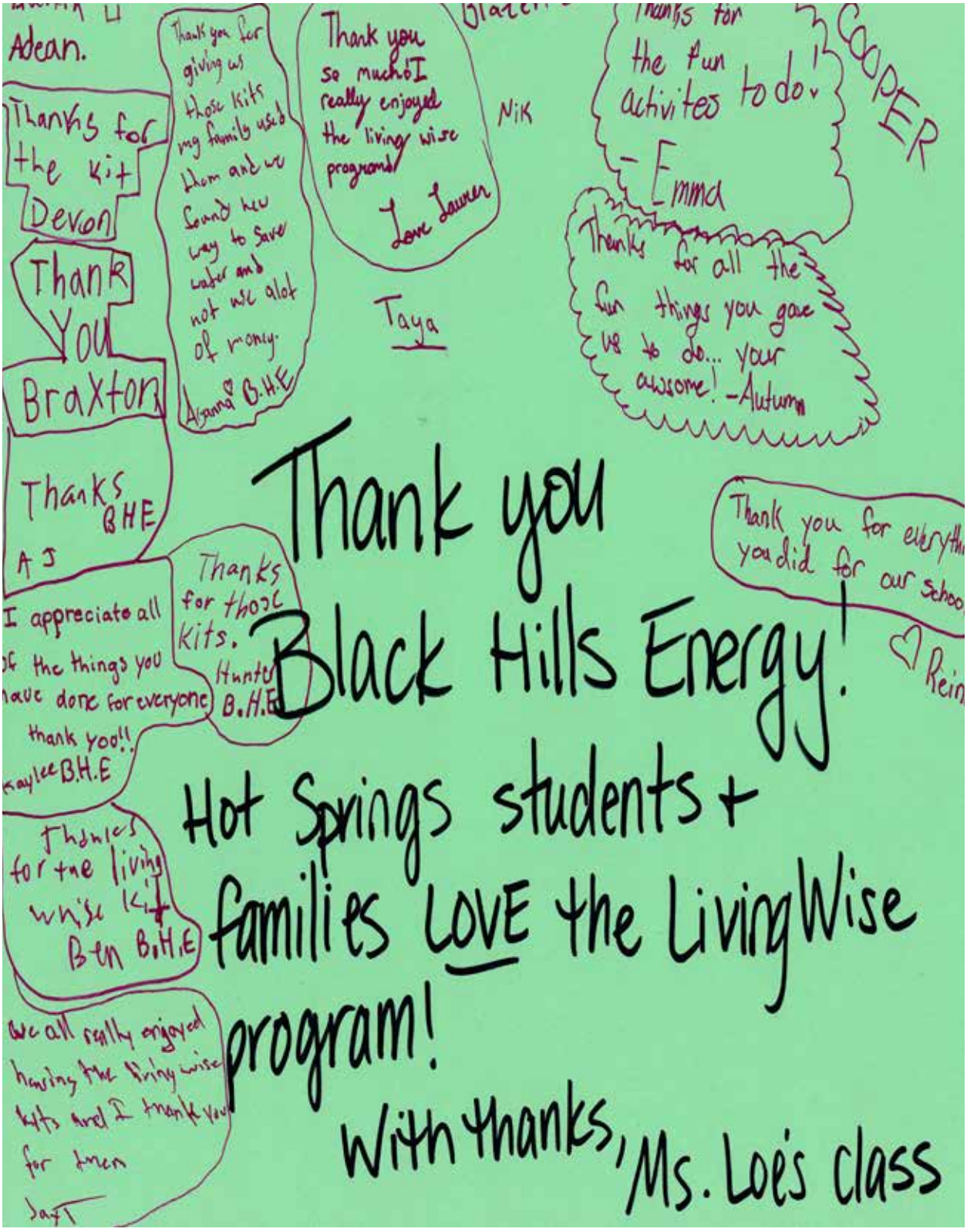
100% of participating parents indicated they would continue to use the kit items after the completion of the program.

100% of participating parents indicated they would like to see this program continued in local schools.

Which aspect of the program did you like best?

"We really liked the showerhead."
Lisa Simonson, Black Hawk Elementary School

F. Teacher Letters



G. Student Letters

Thank you for giving us the opportunity to learn more about types of energy. I never knew there were so many types of energy and so many ways to save it. I had so much fun doing the living wise kit. (Soraya)

Thank you Black Hills Energy for giving us kits to use in our homes. I learned a lot about conserving energy. My favorite part about the kit is the big shower head. (Ryne)

I am sincerely thankful that you opened up to give me this LivingWise Kit and all of its contents. I had a lot of fun trying out all the experiments and finding out how you can save energy and money. I am very thankful for the opportunity to be able to save money for my parents because they are very thankful for all these objects that save us money. Again, thank you for the opportunity. Let's start saving energy and money. (Antonio)

Dear Black Hills Energy, Thank you very much for the living wise kits. They were very fun to use. They taught me a lot. My favorite one was the showerhead. Now I will be able to save water. (Thomas)

Dear Black Hills Energy, Thank you for creating the living wise unit. It taught me to conserve energy by buying those things and changing my routine a little bit. This has changed my perspective on everyday things. Thank You! from, (Wyatt)

Dear Black Hills Energy, Thank you for donating the Living Wise Kit. I enjoyed it a lot. I learned a lot from doing the experiments and questions. I also had fun doing it with family members at my own home. The experiments were easy but a lot of fun. From, (Mary)

Thank you for making the living wise booklet and kit. I have us ed some of the parts. It gave me ideas on what to do during quarantine. I learned a lot from it. (Joseph)

Thank you Black Hills Energy for giving us this fun Living Wise box. I loved the experiments that weren't just fun, they were also helpful. I also loved learning about how electricity is made and how we can conserve it. (Thatcher)

Dear Black Hills Energy, Thank you so much for donating Living Wise kits so I could learn how to save energy in my house. I really enjoyed the experiments. My dad is an Electrician so he helped me understand everything we did. Sincerely, (Henry)

Thank you so much for the Living Wise Kits you kindly donated to our class. That was very sweet of you guys. We very much appreciate it. It's a nice thing to do. Also during this time we can fiddle around with them!! Thanks!! (Claire)

Thank you for sending us the Living wise kits and books. It is really fun to learn about science and natural gasses, how to put showerheads in and water faucets. (Ryan)

Thank you for the living wise kits. Thay are fun and I have learned how to save energy. (Rush)

Student Letters

(continued)

Thank you Black Hills Energy for helping provide our class with science lessons and everyday life lessons. These lessons helped me learn how to use less water and energy. I enjoyed using the kit and reading the booklets. My favorite part was reading about all the ways to save energy and reading the tips. Thank you again Black Hills Energy for providing us kits and booklets. (Chloe)

Thank you for the Living Wise Kit. It was very fun. I liked the experiments. They taught me how to save energy. The experiments also taught me how to save water with the high efficiency shower head. Thanks again, Black Hills Energy. (Jack)

Dear Black Hills Energy, Thank you so much for the living wise kit. It helped me learn that saving energy, and water is important. If we didn't save water and energy we would lose them. You taught me lots of ways to save them. Thank you again for the kit. Sincerely, (Haley)

Dear Black Hills Energy, Thank you for my Living Wise kit. I learned that more people work in wind farms then in coal mines. I learned that 1% of the world's water is freshwater. I learned that the night light only works at night because if you cover the bottom sensor it turns on. I appreciate the opportunity to learn stuff and to be donated energy saving products. Sincerely, (Leah)

Dear Black Hills Energy, Thank you for the projects. It was VERY fun. I loved the projects and have the night light in my room. I learned how to save money and energy. It is interesting how there are different sources that create energy.
Sincerely Vincent

Thank you Black Hills Energy for donating the Living Wise Kits to our class. I appreciate that we learned so much from them. I think saving energy is important and this helped me save resources. I think we all learned from the Living Wise Kit and we appreciate that. Thank you for donating the Living Wise Kits to our class. (Ivana)

Dear Black Hills Energy,
Thank you for sending us Living Wise unit kits to help us better understand this lesson we are currently working on. It helps us better understand this lesson by giving us hands-on experiments. It also gives us some math to work on trying to find how much we can save using these products. I have learned so much using this kit. Thank you for helping us during this hard time. Stay safe! (Maryn)

Dear Black Hills Energy ,
I just wanted to say thank you for sending me and the rest of the grade a Living Wise kit. :) I also wanted to say thank you for giving all the people in the Black Hills electricity. Also thank you for putting in your time to make and give out our kits. I did almost all of the activities inside of the Living Wise kit and thought they were fun!
Have a nice day! (Macey :)

Dear BHE, Thanks for donating these "Living Wise" packets to our class! I learned so much! I loved putting a bag over my shower head to learn the amount of water we use in 5 seconds! For us it was kinda a lot! Again thanks for helping us save money on water and electricity!

Student Letters

(continued)

Dear Black hills energy, Thank you for donating the living wise kits to our class. The kit helped me learn that it is very important to save water and electricity. The kit also helped me learn that just by installing the led light and the shower head that those materials helped my family and I save money and water. I just wanted to say thank you very much for giving the science kits to my class and I. The living wise kits were great examples on how to save water , electricity, and energy. Thank you so very much. Sincerely, Samantha

I had fun doing it. The experiment helped save energy. It helped save water to. It was fun. It also helped you learn (Charles)

Thank you black hills energy for donating the kits to us. I had a great time learning and the experiments were awesome. It was one of my favorite lessons this year. the experiments were great.
senserley, grant

Dear LivingWise Program, Thank you so much for the kit you provided for us. It helped me understand how to save water and energy. This was a great kit full of activities that my family got to do together. The best part was spending time with my family learning how to conserve water and energy and saving money in the process. Thank you again, (Carter)

Black Hills Energy, Thank you for sending us that Living Wise Kit. What I learned was the high-efficiency shower head will allow me to save water and money. I enjoyed experimenting with the kit. (Avery)

Thank you Black Hills energy for all the awesome tools. We used every tool that you gave us.Thank you for shower head, we needed one mine just broke.Also I loved playing doctor with my sister with the thermometer. Thank you so much!!!!!!!!! (Jackson)

Dear Black Hills Energy, Thank you for kindly donating us the living wise kits. They were very fun to learn about. It was very kind of you for donating the kits. It was fun do install the items in the kit with my parents. Sincerely, Nevaeh

Dear Black Hills Energy, thank you for donating the Living Wise Kits to our class. It was so fun and it tot me more about energy sources and more. I really like the experiments and I think they will help my family and I save more energy and water in the future. I especially liked the toilet leek detectors. Thank you very much from (Keelie)

Thank you Black Hills Energy for giving me the Living Wise Kit. I had a lot of fun doing the different experiments and learning how we can save money and resources. I really liked the hands-on items and testing them around my house. My family has turned down our thermostat and water heater to save money and energy. Thank you again for your generosity. (Brody)

I liked it. It was fun. It saved energy. It saves water to. My favorite part was the experiments. (Charlie)

Student Letters

(continued)

Dear Black Hills Energy, Thank you for the living wise kit and books. You helped me save me and my family money, and It was VERY fun doing it too. Your kit made me learn a bunch over this pandemic.You taught me about fossil fuels and about how I can use them wisely.It has helped me see what I can do to save energy. Thank you for helping me live wise.
Sincerely, Lily

Thank you Black Hills Energy for donating the Living Wise Kits to our class. I learned a great deal about our daily living and efficient energy. (Vinh)

Thank you so very much for donating the kits to our class! The kits were very helpful. Another thing that I enjoyed about the kits is they were very easy to install. What I learned is you always want to do what's best for the Earth. I just wanted to say thank you for donating those kits to our class! You gave up your time to help others in the community. Thank you very much! Sincerely,
Samantha (she wrote two thank you letters!)

Thank you Black Hills Energy for donating this awesome Living Wise kit. I really enjoyed all of the cool things and activities that it contained. It was a fun project. I am happy that I could help my family save energy and water. (Brennen)

Dear Black Hills Energy, thank you for sending these kits. I think you made a difference in our lives in many ways. One thing you helped us with was to help us save money. You also helped us learn something new. Once again thank you. (Isabella)

Thank you It was a very fun and full kit. I enjoyed it. Our new washer is eco friendly. (Ariel)

Thank you for sending us this packet. (Dylan)

Dear Black Hills Energy, Thank you for your thoughtfulness in sending the Living Wise Kits to our class. I have learned interesting things such as fossil fuels and how to save water and energy. Because of what I learned I always make sure to shut off the lights when I leave my room and I have been taking shorter showers. Thank you for your generosity. (Gianna)

Student Letters

(continued)

Dear Black Hills Energy, I would like to thank you for putting together these awesome experiments and books for us to learn from. I learned a lot of new and interesting, scientific things. I like science a lot, maybe because my dad is a physicist. He teaches me many interesting facts about science. Sincerely, Marek

Dear Black Hills Energy, Thank you so much for sending us all the cool installments to help us have a better life. Thank you for spending all that money on our school systems so we could learn a very very valuable lesson on how to save energy and water. I really enjoyed the light bulb because it was very effective and very easy to install. It was very nice of you guys to contribute to our education.I'm sure my class had an amazing time. I know some of them at least did because they told me. Thank you for reading my letter and I hope you all have a lovely quarantine.
Love, (Violet)

Dear Black Hills Energy, I really enjoyed all the fun experiments! I had a great time learning about energy and natural gasses. The kits were fun and thank you for gifting them.I had fun using the objects in the kit. Thank you sincerely, Cecelia

Thanks Black Hills Energy with giving us this stuff. It helped me learn. It helped me understand stuff. So thanks for the stuff. God Bless and have a great day! (Henry W)

Dear BHE,
Our class loved the boxes. They were very fun to read about and do. I would love to do these again. My favorite activity was the shower head because my shower has a hose. Thank you Black Hills Energy. (Bailey)

"We really liked the showerhead."

Lisa Simonson, Parent

Black Hawk Elementary School

Appendices

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Projected Savings from Showerhead Retrofit

Showerhead retrofit inputs and assumptions:

Average household size:	**4.55**	people[1]
Average number of full bathrooms per home:	**2.21**	full bathrooms per home[1]
% of water heated by gas:	**53.64%**	[1]
% of water heated by electricity:	**46.36%**	[1]
Installation / participation rate of:	**51.13%**	[1]
Average Showerhead has a flow rate of:	**2.50**	gallons per minute[2]
Retrofit Showerhead has flow rate of:	**1.75**	gallons per minute[3]
Number of participants:	**1,035**	[1]
Shower duration:	**8.20**	minutes per day[2]
Showers per day per person:	**0.67**	showers per day[2]
Product life:	**10.00**	years[3]

Projected Water Savings:

Showerhead retrofit projects an **annual** reduction of:	**1,639,384**	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	**16,393,843**	gallons[5]

Projected Electricity Savings:

Showerhead retrofit projects an **annual** reduction of:	**99,861**	kWh[2,6]
Showerhead retrofit projects a **lifetime** reduction of:	**998,613**	kWh[2,7]

Projected Natural Gas Savings:

Showerhead retrofit projects an **annual** reduction of:	**5,778**	therms[2,8]
Showerhead retrofit projects a **lifetime** reduction of:	**57,777**	therms[2,9]

1 Data Reported by Program Participants.

2 (March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf

3 Provided by manufacturer.

4 [(Average Household Size x Shower Duration x Showers per Day per Person) ÷ Average Number of Full Bathrooms per Home] x (Average Showerhead Flow Rate - Retrofit Showerhead Flow Rate) x Number of Participants x Installation Rate x 365 days

5 [(Average Household Size x Shower Duration x Showers per Day per Person) ÷ Average Number of Full Bathrooms per Home] x (Average Showerhead Flow Rate - Retrofit Showerhead Flow Rate) x Number of Participants x Installation Rate x 365 days x Product Life

6 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity

7 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life

8 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas

9 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life

Projected Savings from Kitchen Faucet Aerator Retrofit

Kitchen Faucet Aerator retrofit inputs and assumptions:

Average household size:	**4.55**	people[1]
% of homes with a dishwasher:	**75.64%**	[1]
% of homes without a dishwasher:	**24.36%**	[1]
% of water heated by gas:	**53.64%**	[1]
% of water heated by electricity:	**46.36%**	[1]
Installation / participation rate of:	**28.03%**	[1]
Number of participants:	**1,035**	[1]
Average Kitchen Faucet Aerator has a flow rate of:	**2.50**	gallons per minute[2]
Retrofit Kitchen Faucet Aerator has flow rate of:	**1.50**	gallons per minute[3]
Product life:	**5.00**	years[3]
Length of use without dishwasher:	**15.00**	minutes per day[4]
Length of use without dishwasher (each family member):	**1.00**	minute per day[4]
Length of use with dishwasher:	**3.00**	minutes per day[4]
Length of use with dishwasher (each family member):	**0.50**	minutes per day[4]

Projected Water Savings:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**926,641**	gallons[5]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**4,633,206**	gallons[6]

Projected Electricity Savings:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**40,772**	kWh[4,7]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**203,862**	kWh[4,8]

Projected Natural Gas Savings:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**2,415**	therms[4,9]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**12,077**	therms[4,10]

1 Data Reported by Program Participants.

2 Vickers, Amy (2002). Water Use and Conservation. Amherst, MA: WaterPlow Press.

3 Provided by manufacturer.

4 Quantec, LLC. (2008). Impact of Flipping the Switch: Evaluating the Effectiveness of Low Income Residential Energy Education Programs. Portland: Drakos, Jamie et al.

5 {Length of use without dishwasher + [Average household size x Length of use without dishwasher (each family member))] x % of homes without dishwasher} + {Length of use with dishwasher + [Average household size x Length of use with dishwasher (each family member))] x % of homes with dishwasher} x [Average Kitchen Aerator flow rate – Retrofit Kitchen Aerator flow rate] x Number of participants x Installation rate x 365 days

6 {Length of use without dishwasher + [Average household size x Length of use without dishwasher (each family member))] x % of homes without dishwasher} + {Length of use with dishwasher + [Average household size x Length of use with dishwasher (each family member))] x % of homes with dishwasher} x [Average Kitchen Aerator flow rate – Retrofit Kitchen Aerator flow rate] x Number of participants x Installation rate x 365 days x Product Life

7 Projected Annual Water Savings x [(8.33lbs. / gallon x 35°FΔT) ÷ (3413 x water heater efficiency (0.90)] x % of Water Heated by Electricity

8 Projected Lifetime Water Savings x [(8.33lbs. / gallon x 35°FΔT) ÷ (3413 x water heater efficiency (0.90)] x % of Water Heated by Electricity

9 Projected Annual Water Savings x [(8.33lbs. / gallon x 35°FΔT) ÷ (100,000 x water heater efficiency (0.60)] x % of Water Heated by Natural Gas

10 Projected Lifetime Water Savings x [(8.33lbs. / gallon x 35°FΔT) ÷ (100,000 x water heater efficiency (0.60)] x % of Water Heated by Natural Gas

Projected Savings from LED 9-watt Light Bulb Retrofit

LED Light Bulb retrofit inputs and assumptions:

Product life:	**20.00**	years[1]
Watts used by the LED light bulb:	**9**	watts[1]
Hours of operation per day:	**2.81**	hours per day[2]
Average watts used by the replaced light bulb:	**52.29**	watts[3]
Installation / participation rate of:	**70.23%**	[3]
Number of participants:	**1,035**	[3]

Projected Electricity Savings:

The LED Light Bulb retrofit projects an **annual** reduction of:	**32,270**	kWh[2,4]
The LED Light Bulb retrofit projects a **lifetime** reduction of:	**314,631**	kWh[2,5]

1 Provided by manufacturer.

2 Frontier Associates. (2011). Oncor's LivingWise Program: Measurement & Verification Update.

3 Data reported by program participants.

4 {[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Number of participants x Installation rate

5 {[(Average wattage of light bulb replaced - Wattage of LED light bulb) x Product Life] ÷ 1,000} x Number of participants x Installation rate

Projected Savings from LED Night Light Retrofit

LED Night Light retrofit inputs and assumptions:

Average length of use:	**4,380**	hours per year[1]
Average night light uses:	**7**	watts
Retrofit night light uses:	**0.50**	watts
Product life:	**10.00**	years[2]
Energy saved per year:	**28**	kWh per year
Energy saved over life expectancy:	**285**	kWh
Retrofit / participation rate of:	**83.33%**	[3]
Number of participants:	**1,035**	[3]

Projected Electricity Savings:

The LED Night Light retrofit projects an **annual** reduction of:	**24,555**	kWh[4]
The LED Night Light retrofit projects a **lifetime** reduction of:	**245,554**	kWh[5]

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

4(kWh per year x Number of participants) x Installation rate

5((kWh per year x Number of participants) x Installation rate) x Product life

Projected Savings from FilterTone® Alarm Installation

FilterTone® installation inputs and assumptions:

Annual energy (electricity) use by a central system air conditioner:	**1,637**	kWh[1]
Annual energy (natural gas) use by central space heating or furnace:	**173**	therms[1]
Projected increase in efficiency (electricity):	**1.75%**	[2]
Projected increase in efficiency (natural gas):	**0.92%**	[2]
Product life:	**10.00**	years[3]
Installation / participation rate of:	**14.39%**	[4]
Number of participants:	**1,035**	[4]

Projected Electricity Savings:

The FilterTone installation projects an **annual** reduction of:	**4,268**	kWh[5]
The FilterTone installation projects a **lifetime** reduction of:	**42,678**	kWh[6]

Projected Natural Gas Savings:

The FilterTone installation projects an **annual** reduction of:	**237**	therms[7]
The FilterTone installation projects a **lifetime** reduction of:	**2,371**	therms[8]

1 *U.S. Department of Energy, Energy Information Administration 2005 Residential Energy Consumption Web site for California: http://www.eia.gov/consumption/residential/data/2005/*

2 *Reichmuth P.E., Howard. (1999). Engineering Review and Savings Estimates for the 'Filtertone' Filter Restriction Alarm.*

3 *Provided by manufacturer.*

4 *Data reported by program participants.*

5 *Annual energy (electricity) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (electricity) x Installation rate x Number of participants*

6 *Annual energy (electricity) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (electricity) x Installation rate x Number of participants x Product life*

7 *Annual energy (natural gas) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants*

8 *Annual energy (natural gas) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants x Product life*

Projected Savings from Toilet Leak Repair

Toilet Leak repair inputs and assumptions:

Number of participants:	**1035**	[1]
% of toilets leaking:	**7.03%**	[1]
% of toilets where the leak was repaired:	**18.31%**	[1]
Number of homes with fixed toilet leaks:	**13.32**	[1]
USGS gallons lost per year per leak:	**12,621.29**	GPY per leak[2]
Product Life (years of water savings):	**5.00**	years[3]

Projected Water Savings:

Toilet Leak Repair projects an **annual** reduction of:	**168,175**	gallons/year[4]
Toilet Leak Repair projects a **lifetime** reduction of:	**840,875**	gallons[5]

1 Data Reported by Program Participants.

2 http://www.epa.gov/WaterSense/pubs/fixleak.html

3 Estimation of years before toilet begins leaking again. Frontier and Associates

4 USGS gallons lost per year per leak x 1 leak per home x Number of homes with fixed toilet leaks

5 USGS gallons lost per year per leak x 1 leak per home x Number of homes with fixed toilet leaks x Product Life

Home Check-Up

1 How many kids live in your home (age 0-17)?	
1	18%
2	38%
3	24%
4	14%
5	7%
2 How many adults live in your home (age 18+)?	
1	16%
2	70%
3	13%
4	1%
5+	0%
3 How is your water heated?	
Natural Gas	25%
Electricity	46%
Propane	28%
4 Does your home have a dishwasher?	
Yes	76%
No	24%
5 How many half-bathrooms are in your home?	
0	72%
1	22%
2	5%
3	1%
4+	0%
6 How many full bathrooms are in your home?	
1	25%
2	42%
3	24%
4	6%
5+	3%

Due to rounding of numbers, percentages may not add up to 100%

Home Check-Up

(continued)

7 What fuel is used as the main source of energy to heat your home?

Natural Gas	28%
Electricity	38%
Heating Oil	0%
Wood	6%
Propane	26%
Other	2%

8 What type of air conditioning unit do you have?

Central Air Conditioner	71%
Evaporative Cooler	2%
Room Unit	17%
Don't Have One	10%

9 What type of home do you live in?

Single Family home	85%
Multi-Family (2-4 units)	9%
Multi-Family (5-20 units)	6%
Multi-Family (21+ units)	0%

10 Was your home built before 1992?

Yes	53%
No	47%

11 Is your home owned or rented?

Owned	80%
Rented	20%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

1 Did you install the new High-Efficiency Showerhead?	
Yes	51%
No	49%
2 Did your family install the new Kitchen Faucet Aerator?	
Yes	28%
No	72%
3 Was your toilet leaking?	
Yes	7%
No	93%
4 If you answered "yes" to question 3, were the leaks repaired?	
Yes	18%
No	82%
5 Did your family install the LED Light Bulb?	
Yes	70%
No	30%
6 If you answered "yes" to question 5, what was the wattage of the incandescent bulb you replaced?	
40-watt	8%
60-watt	35%
75-watt	13%
100-watt	1%
Other	43%
7 Did your family install the FilterTone Alarm?	
Yes	14%
No	86%
8 How much did your family turn down the thermostat in winter for heating?	
1 - 2 Degrees	16%
3 - 4 Degrees	12%
5+ Degrees	9%
Didn't Adjust Thermostat	63%
9 How much did your family turn up the thermostat in summer for cooling?	
1 - 2 Degrees	15%
3 - 4 Degrees	7%
5+ Degrees	6%
Didn't Adjust Thermostat	71%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

(continued)

10	Did your family install the LED Night Light?	
	Yes	83%
	No	17%
11	Did your family lower your water heater settings?	
	Yes	8%
	No	92%
12	Did your family raise the temperature on your refrigerator?	
	Yes	9%
	No	91%
13	Did you work with your family on this program?	
	Yes	88%
	No	12%
14	Did your family change the way they use water?	
	Yes	36%
	No	64%
15	Did your family change the way they use energy?	
	Yes	44%
	No	56%
16	How would you rate the LivingWise Program?	
	Excellent	35%
	Good	49%
	Fair	14%
	Poor	2%

Due to rounding of numbers, percentages may not add up to 100%

Participant List

SCHOOL	TEACHER	T	S
Belle Fourche Middle School	Ann Anderson	1	113
Black Hawk Elementary School	Rachel Barbaruolo	1	21
Black Hawk Elementary School	Holly Mehlhaff	1	22
Black Hawk Elementary School	Erin Preston	1	22
Black Hills Christian Academy	Laura Odenbach	1	9
Canyon Lake Elementary School	Katherine Ellett	1	44
Children's House Montessori	Jill Pena	1	15
Children's House Montessori	Karey Verchio	1	9
Hill City Elementary School	Colleen Clapper	1	31
Hot Springs Elementary	Koreen Hammel	1	18
Hot Springs Elementary	Carrie Loe	1	25
Hot Springs Elementary	Nancy Mulcahy	1	25
Lead-Deadwood Elementary School	Amy Vande Velde	1	60
Robbinsdale Elementary School	Brianna Arity	1	24
Robbinsdale Elementary School	Brittany Condon	1	25
Robbinsdale Elementary School	Bradley Horan	1	24
South Canyon Elementary	Kyle Biggerstaff	1	48
South Park Elementary School	Keila Meverden	1	25
South Park Elementary School	Michelle Wysuph	1	22
St Paul's Lutheran School	Philip Miller	1	6
St. Elizabeth Ann Seton Elementary School	Heather Eldridge	1	51
Stagebarn Middle School	Jessica Henrichsen	1	27
Stagebarn Middle School	Sara Mccurdy	1	30

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

SCHOOL	TEACHER	T	S
Stagebarn Middle School	Stacey Ross	1	27
Stagebarn Middle School	Cooper Stanforth	1	27
Vandenberg Elementary School	Trisha Baragar	1	25
Vandenberg Elementary School	Aisha Durfey	1	25
Vandenberg Elementary School	Maranda Johnson	1	25
Vandenberg Elementary School	Brandi Marler	1	25
Vandenberg Elementary School	Krystle Marshall	1	25
Vandenberg Elementary School	Ronald Mays	1	25
Vandenberg Elementary School	Kyle McFarland	1	25
Vandenberg Elementary School	Lorie Meade	1	25
Vandenberg Elementary School	Sherry Nelson	1	25
Vandenberg Elementary School	Christy Noriega	1	25
	TOTALS	**35**	**1,000**
	TOTAL PARTICIPANTS	**1,035**	

Note: "T" represents number of teachers and "S" represents number of students

Teacher Program Evaluation Data

1 The materials were clearly written and well organized.	
Strongly Agree	67%
Agree	33%
Disagree	0%
Strongly Disagree	0%
2 The products in the Kit were easy for students to use.	
Strongly Agree	33%
Agree	67%
Disagree	0%
Strongly Disagree	0%
3 Students have computers and access to the internet in my classroom.	100%
Yes	0%
No	
4 Students indicated that their parents supported the program.	
Yes	100%
No	0%
5 Would you conduct this Program again?	
Yes	100%
No	0%
6 Would you recommend this program to other colleagues?	
Yes	100%
No	0%

Due to rounding of numbers, percentages may not add up to 100%

Parent/Guardian Program Evaluation Data

1 Was the Program easy for you and your child to use?

Yes	100%
No	0%

2 Will you continue to use the Kit items after the completion of the Program?

Yes	100%
No	0%

3 Would you like to see this Program continued in local schools?

Yes	100%
No	0%

Due to rounding of numbers, percentages may not add up to 100%

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