3/23/2023

PACIFICORP COMMUNICATIONS, OUTREACH, AND EDUCATION

WASHINGTON Program Year 2022 Activities

Preface

The Company uses customer communications, paid media, earned media and program specific outreach to communicate the value of energy efficiency and provide information regarding low-cost and no-cost energy efficiency measures. The Company strives to educate customers on the availability of technical assistance, services, and incentives to engage customers in reducing their energy use.

CUSTOMER COMMUNICATIONS

As part of the Company's regular communications to its customers, newsletters and bill statement communications promote energy efficiency programs and solutions. The Company uses its website and social media, such as Facebook, to communicate and engage customers with its energy services.

EARNED MEDIA

Earned media is managed by the Company's external communications department in cooperation with the regional business managers in Washington. "Earned media" generally refers to favorable television, radio, newspaper, or internet news coverage gained through press releases, media events, opinion pieces, story pitches, or other communication with news editors and reporters.

WATTSMART CAMPAIGN

In 2022, the Company's Wattsmart's communications campaign aimed to inform and educate customers about the benefits of energy efficiency. Most communications were in both English and Spanish and encouraged customers to take meaningful actions to reduce energy use and lower their bills.

Key strategies include:

- Implement an integrated advertising campaign that features Wattsmart energy efficiency messaging in English and Spanish to encourage customers to reduce energy use.
- Increase customer awareness of energy efficiency and encourage participation in the Company's Wattsmart programs.

- Educate customers on how Wattsmart incentives and savings tools can help them turn a to-do item into a job well done.
- Encourage customers to check out Business Energy Reports to view usage and get tips for saving.

General Key Messages:

- Using energy wisely at home and in your business saves you money so you can achieve your goals.
- Pacific Power empowers customers with meaningful energy choices.
    - We want to help you keep your costs down.
    - We offer Wattsmart programs, cash incentives and expertise to help you save money in your home or business.

To reach customers, the Company used a combination of direct mail, magazine advertising, email, targeted bill inserts, cable TV, radio, social media, print, digital video, digital display and search engine advertising. The Wattsmart campaign features images of customers taking small steps around their homes or businesses to save energy. The messages help establish Pacific Power as an energy partner with a portfolio of programs and services built around customer needs.

Table 1 outlines the Washington media channels used and the impressions achieved.

Table 1 - 2022 Media Channels

Communication Channel & Language(s)	Description	2022 Media Impressions
Cable TV (Spanish)	Cable TV ads on Spanish-language stations help reach diverse communities and audiences.	450 spots
Radio (English and Spanish)	Radio helps extend reach and amplify other communications channels.	825 TRPs (target rating points)
Digital Video (English and Spanish)	Short video ads that play before feature videos on YouTube, social media or other digital platforms.	794,566 impressions
Cinema Advertising	Onscreen ads placed on screens in the Century Grand Cinema in Walla Walla	12 screens
Digital Display (English)	Banner ads on local news sites and other websites.	2,520,375 impressions
OTT (English and Spanish)	OTT stands for “Over The Top” and refers to advertising on streaming services (Netflix, Hulu, Amazon Prime Video, etc).	186,831 impressions
Social Media Advertising (English and Spanish)	Advertising on Facebook and Instagram.	1,891,133 impressions

Communication Channel & Language(s)	Description	2022 Media Impressions
Search Engine Marketing (English)	Internet search ads focused on energy efficiency key words.	32,079 impressions
Twitter @PacificPower_WA	Tweets about energy efficiency a few times per month.	1,209 followers
Facebook www.facebook.com/pacificpower Instagram @PacificPower	Posts about energy efficiency solutions and more.	29,869 Facebook followers 1,329 Instagram followers
Irrigation direct mail	Mailing to irrigation customers to remind them of incentives for irrigation upgrades and replacements	Mailed to approximately 2,500 customers in spring and fall
Yakima Valley Business Times	Ran ads twice in the Agriculture Industry and Dairy Industry Focus sections	7,000 subscribers and 200,000 readers
Email	Emails to residential and business customers, ranging from general information to specific product promotions, like heat pumps and smart thermostats	10 emails with more than 300,000 reached (one email address may have been reached in 2+ emails)
Home Energy Report emails	Emails to residents and directing them to their home energy reports	Sending about 25,000 emails per month. Open rate is 49% and click through rate is around 3.4%.
Bill onsert	Included a statement stuffer in Washington residents' bills about instant coupon savings	Mailed to approximately 60,000 customers

BE WATTSMART, BEGIN AT HOME/ENERGY EDUCATION IN SCHOOLS

The Company offers a Wattsmart Schools education program through the National Energy Foundation (NEF). The program is designed to develop a culture of energy efficiency among teachers, students, and families. The centerpiece is a series of one-hour presentations with educational and entertaining video components as well as hands-on, large group activities for 4th grade students. Teachers are provided instructional materials for use in their classrooms, and students are sent home with a Home Energy Worksheet to explore energy use in their homes and to encourage efficient behaviors.

In 2022, presentations were conducted by NEF mostly in person, although one presentation was online with a digital presentation and interactive web components. Presentations were made available to Washington schools from October 1 to December 1, 2022. The program met its outreach goals of reaching 3,654 students and 154 teachers with 47 school presentations and 60 percent of "Home Energy Worksheets." which are used as part of a home energy audit activity, completed, and returned.

2022

NEF

Be Wattsmart, Begin at home

WASHINGTON

Program Report

Prepared for:

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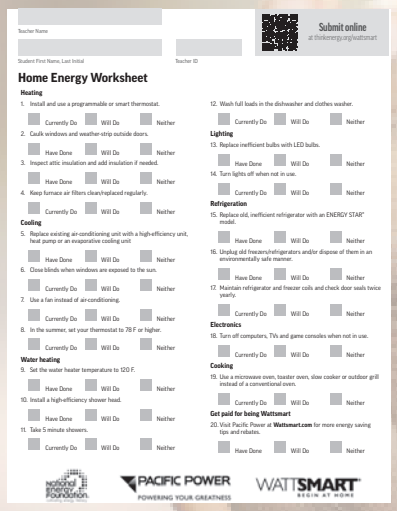
March 13, 2023

Savings



Teacher Name

Student First Name, Last Initial

Teacher ID

Submit online
at thinkenergy.org/wattsmart

Home Energy Worksheet

Heating

1. Install and use a programmable or smart thermostat.
   Currently Do | Will Do | Neither
2. Caulk windows and weather-strip outside doors.
   Have Done | Will Do | Neither
3. Inspect attic insulation and add insulation if needed.
   Have Done | Will Do | Neither
4. Keep furnace air filters clean/replaced regularly.
   Currently Do | Will Do | Neither

Cooling

5. Replace existing air-conditioning unit with a high-efficiency unit, heat pump or an evaporative cooling unit
   Have Done | Will Do | Neither
6. Close blinds when windows are exposed to the sun.
   Currently Do | Will Do | Neither
7. Use a fan instead of air-conditioning.
   Currently Do | Will Do | Neither
8. In the summer, set your thermostat to 78 F or higher.
   Currently Do | Will Do | Neither

Water heating

9. Set the water heater temperature to 120 F.
   Have Done | Will Do | Neither
10. Install a high-efficiency shower head.
    Have Done | Will Do | Neither
11. Take 5 minute showers.
    Currently Do | Will Do | Neither
12. Wash full loads in the dishwasher and clothes washer.
    Currently Do | Will Do | Neither

Lighting

13. Replace inefficient bulbs with LED bulbs.
    Have Done | Will Do | Neither
14. Turn lights off when not in use.
    Currently Do | Will Do | Neither

Refrigeration

15. Replace old, inefficient refrigerator with an ENERGY STAR® model.
    Have Done | Will Do | Neither
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.
    Have Done | Will Do | Neither
17. Maintain refrigerator and freezer coils and check door seals twice yearly.
    Currently Do | Will Do | Neither

Electronics

18. Turn off computers, TVs and game consoles when not in use.
    Currently Do | Will Do | Neither

Cooking

19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.
    Currently Do | Will Do | Neither

Get paid for being Wattsmart

20. Visit Pacific Power at **Wattsmart.com** for more energy saving tips and rebates.
    Have Done | Will Do | Neither

national energy foundation

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WATTSMART
BEGIN AT HOME

Home Energy Worksheets

– Returned: 1,380 –

– 60% –

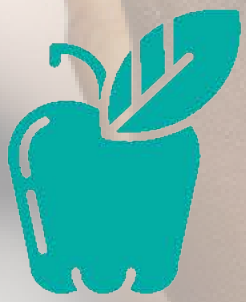
- Online - 31.45%

- Paper - 68.55%

Participants

Students

– 3,654 –



Teachers

– 154 –

Schools

– 47 –

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Program Overview

Program Description

"The program is very engaging and interesting to the students. The program is also able to reach a large number of people."

"This was a highly engaging program for my students. They all wanted the nightlight."

"Love it and worth the time!"

"Wonderful program and a great way to expose young minds to important information today, that will impact the future of our world. Thank you for the opportunity."

- Washington Teacher Participants

The Be Wattsmart, Begin at home program is a collaborative partnership between Pacific Power and the National Energy Foundation (NEF). It encourages teachers, students and families to "Be Wattsmart" with their energy use. The program objective is to build energy awareness, throughout the school year, with an engaging presentation and energy efficiency curriculum. The program also expands enthusiasm to homes via Pacific Power branded curriculum, games and online resources.

Building Collaborations

"It's great for integration at the 4th grade level and the monetary incentive is the icing on the cake."

"The kids really love these assemblies and learn so much!"

"Professional, grade-level content that kept kiddos engaged and ready to do their part."

"This was the BEST WATTS SMART PRESENTATION EVER!!!"

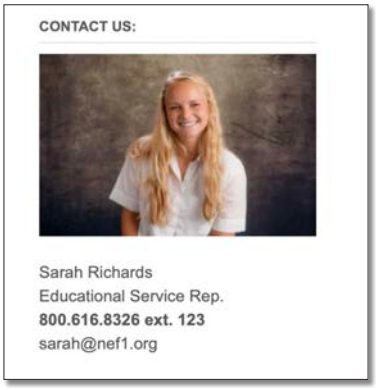
- Washington Teacher Participants

The Be Wattsmart, Begin at home program provided energy efficiency content that was custom developed to support the Washington State Office of Education's Core Curriculum for fourth grade. Teachers appreciated the collaborative efforts to align program components to their learning standards. Curriculum correlations were provided to teacher participants in the *Teacher Guide* delivered to each teacher prior to their presentation.

NEF utilized multiple strategies to support teacher and parent participants:

- Dedicated educational service representative
- *Parent Introduction Letter*
- Spanish documents – *Home Energy Worksheet* and *Parent Introduction Letter*
- Online and hard copy *Home Energy Worksheets*
- Changed title of the student guide to family guide to support the efforts of including families in the take home information.

- Mini-grants for teachers with a qualifying *Home Energy Worksheet* return
- Automated emails to communicate program details, including submission of the *Home Energy Worksheets* and progress toward the mini-grant
- Online virtual presentations and live presentations to support various learning situations



Program Registration

NEF developed a postcard to promote the Be Wattsmart, Begin at home program to eligible new teachers and schools. Emails were also used to contact prior participating teachers.

Teachers were given three ways to enroll: calling or emailing the educational service representative, Sarah Richards, or completing the registration online on the program website thinkenergy.org/wattsmart-wa/. After the registration was qualified, a series of email communications with teachers, were sent automatically by the program registration system.

Program Implementation

"We teach about Energy in Science, so having the additional information is a great resource."

"The production quality was super, and the students were engaged. Great job!"

"Your presenters were excellent!"

- Washington Teacher Participants

In-person presentations were conducted by two experienced Energy Educators. NEF required all Energy Educators to be fully vaccinated and take their temperature each morning to protect students and teachers.

The presentation focused on important concepts, such as natural resources, electrical generation, the energy mix used by Pacific Power to generate electricity and tips for energy efficiency in the home. Energy Educators completed demonstrations of making a human electrical circuit, during which they taught key core curriculum concepts such as insulators and conductors of electricity and electrical generation. In-person assemblies included the review game, "Lingo" at designated points throughout the presentation.

To help students remember energy efficiency tips, students viewed "Caitlynn Power" video vignettes produced by PacifiCorp. The videos are a highlight for both teachers and students. In addition, the Caitlynn Power videos were

added to the program website where teachers could access them for further energy instruction and where students could access them to share with their families.

In 2022 a safety concept was added to the program to reinforce electrical safety. The best way to safeguard children against electrical danger is education. Teaching students about how electricity works and then adding best safety practices will help to protect them.

The last portion of the presentation communicated the importance of the program take-home pieces. These documents enabled households to participate in energy education along with students.

Program Materials

"The presenters did a great job!"

"We teach about Energy in Science, so having the additional information is a great resource."

"The entire program is awesome."

- Washington Teacher Participants

A *Parent Letter* was provided to explain the importance of Be Wattsmart, Begin at home. In addition, students were given a *Family Guide* and *Home Energy Worksheet* to share with their families. Students who returned their worksheet or completed a worksheet online, received an LED nightlight featuring the Pacific Power logo as a reward.

The program also added a URL code to both the Parent Letter and the Home Energy Worksheet to direct families to to the program website.

Educators were also given helpful energy educational materials. Each teacher participant was provided a custom Be Wattsmart, Begin at home folder. The folder contained a custom *Teacher Guide* with additional information and activities to supplement and continue energy education in the classroom. Also, in the folder were two NEF instructional posters.

A program *Implementation Steps Flier* assisted teachers in carrying out the program either in-person or virtually. It also gave simple steps for successfully returning *Home Energy Worksheets* and the sponsor *Thanks a "Watt" Card* in the postage paid envelope. A *Rewarding Results Flier* gave information concerning the mini-grant teacher participants would receive for returning their student surveys. Educators received a $50 mini-grant for an 80% return by the December deadline.

Program Website

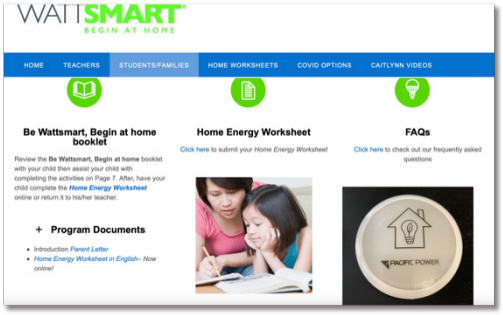
The Be Wattsmart, Begin at home program website, thinkenergy.org/wattsmart-wa/, served multiple purposes for participating teachers, students and families:

Teachers

- Program registration
- Dedicated educational service representative contact information
- Access to program presentations and documents
- Game and education page
- Links to additional resources

Students and Families

- Access to Caitlynn Power videos
- Access to the online Home Energy Worksheets
- Energy efficiency games
- Frequently asked questions about the program
- Program documents posted



Program Accomplishments

- 3,654 students and families reached
- 154 Washington teachers reached
- 47 Washington schools participated
- 92 teachers returned packets
- 51 $50 mini-grants delivered to teachers
- 15 $25 mini-grants delivered to teachers

Attachments

Fall 2022 Participating Schools

School Name	School Address	City	State	Zip
Adams Elementary - Wapato	1309 South Camas Avenue	Wapato	Washington	98951
Adams Elementary - Yakima	723 South 8th Street	Yakima	Washington	98901
Ahtanum Valley Elementary	3006 South Wiley Road	Yakima	Washington	98903
Apple Valley Elementary	7 North 88th Avenue	Yakima	Washington	98908
Artz-Fox Elementary	805 Washington Street	Mabton	Washington	98935
Barge Lincoln Elementary	219 East I Street	Yakima	Washington	98901
Chief Kamiakin Elementary	1700 East Lincoln Avenue	Sunnyside	Washington	98944
Christ the Teacher School	5508 West Chestnut Avenue	Yakima	Washington	98908
Cottonwood Elementary	1041 South 96th Avenue	Yakima	Washington	98908
Davis Elementary	31 Southeast Ash Avenue	College Place	Washington	99324
Dayton Elementary	302 East Park Street	Dayton	Washington	99328
Discovery Lab School	610 North 39th Avenue	Yakima	Washington	98902
Dixie Elementary	902 South Palouse Street	Walla Walla	Washington	99362
East Valley Elementary	1951 Beaudry Road	Yakima	Washington	98901
Edison Elementary	1315 East Alder Street	Walla Walla	Washington	99362
Garfield Elementary	505 Madison Avenue	Toppenish	Washington	98948
Gilbert Elementary	4400 Douglas Drive	Yakima	Washington	98908
Green Park Elementary	1105 East Isaacs Avenue	Walla Walla	Washington	99362
Harriet Thompson Elementary	1105 West 2nd Street	Grandview	Washington	98930
Hoover Elementary	400 West Viola Avenue	Yakima	Washington	98902
Kirkwood Elementary- 5th Grade	403 South Juniper Street	Toppenish	Washington	98948
Lincoln Elementary	309 North Alder Street	Toppenish	Washington	98948
Martin Luther King Elementary	2000 South 18th Street	Union Gap	Washington	98903
McClure Elementary - Grandview	811 West 2nd Street	Grandview	Washington	98930
McClure Elementary - Yakima	1222 South 22nd Avenue	Yakima	Washington	98902
McKinley Elementary	621 South 13th Avenue	Yakima	Washington	98902
Montessori School of Yakima	511 North 44th Avenue	Yakima	Washington	98908
Mountainview Elementary	830 Stone Road	Yakima	Washington	98908
Naches Valley Elementary	151 Bonlow Drive	Naches	Washington	98937
Nob Hill Elementary	801 South 34th Avenue	Yakima	Washington	98902
Outlook Elementary	3800 Van Belle Road	Outlook	Washington	98938
Prospect Point Elementary	55 Reser Road	Walla Walla	Washington	99362
Ridgeview Elementary	609 West Washington Avenue	Yakima	Washington	98903
Robertson Elementary	2807 West Lincoln Avenue	Yakima	Washington	98902
Rogers Adventist School	200 Southwest Academy Way	College Place	Washington	99324
Roosevelt Elementary - Yakima	120 North 16th Avenue	Yakima	Washington	98902
Roosevelt Elementary School - Granger	405 Bailey Avenue	Granger	Washington	98932
Selah Intermediate School	1401 West Fremont Avenue	Selah	Washington	98942
Sharpstein Elementary	410 South Howard Street	Walla Walla	Washington	99362
Terrace Heights Elementary	101 North 41st Street	Yakima	Washington	98901
Union Gap School	3201 4th Street	Union Gap	Washington	98903
Valley View Elementary	515 Zillah Drive	Toppenish	Washington	98948
Waitsburg Elementary	184 Academy Street	Waitsburg	Washington	99361
Washington Elementary	1101 South 9th Street	Sunnyside	Washington	98944
Whitney Elementary	4411 West Nob Hill Boulevard	Yakima	Washington	98908
Wide Hollow Elementary	1000 South 72nd Avenue	Yakima	Washington	98908
Zillah Intermediate	303 2nd Avenue	Zillah	Washington	98953

Program Promotions

Run to Register

Register today to participate in the *free* Be Wattsmart, Begin at home program with your fourth graders!

National Energy Foundation
cultivating energy literacy

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WATTSMART®
BEGIN AT HOME

The Be Wattsmart, Begin at home program provides your fourth graders with electricity learning standards through a fun and interactive presentation! You will also receive free energy education posters, energy activities and earn a mini-grant of up to $50 by participating!

Presentations begin in fall 2022.
Reserve your classroom's spot today at
thinkenergy.org/wattsmart-wa
or email Sarah at sarah@nef1.org.

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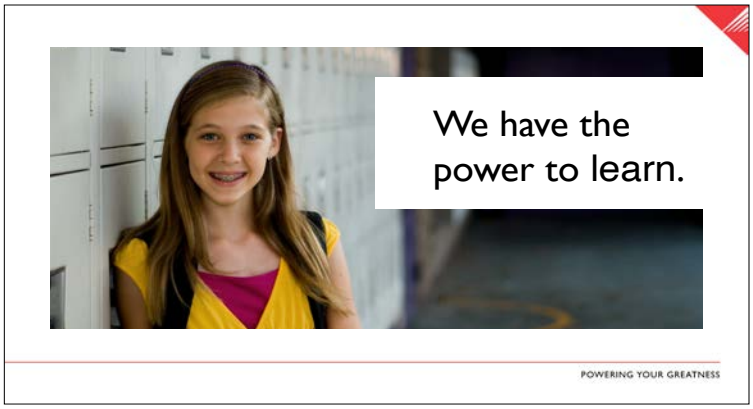
Program Documents

Keynote Presentation

1



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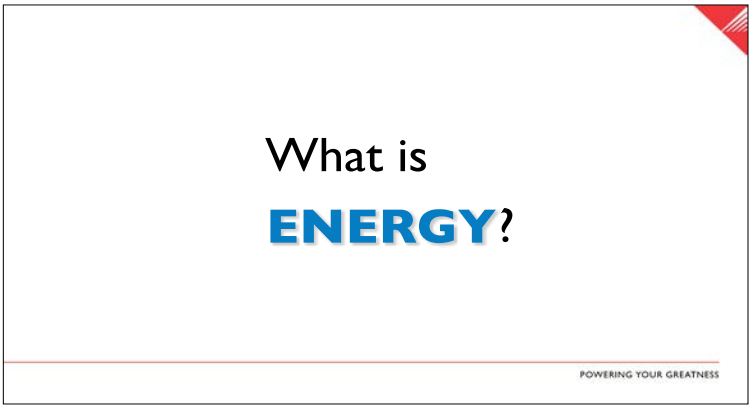

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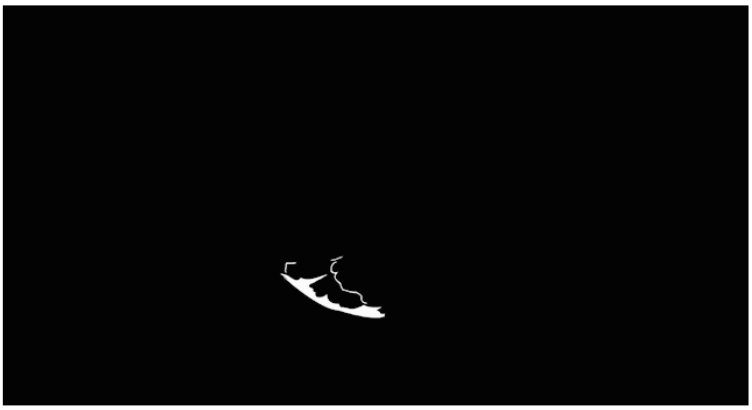

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6

Potential Energy

Kinetic Energy

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7

Natural Resources:

anything we use that comes from the earth or the sun.

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8

Nonrenewable Resources

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9

10

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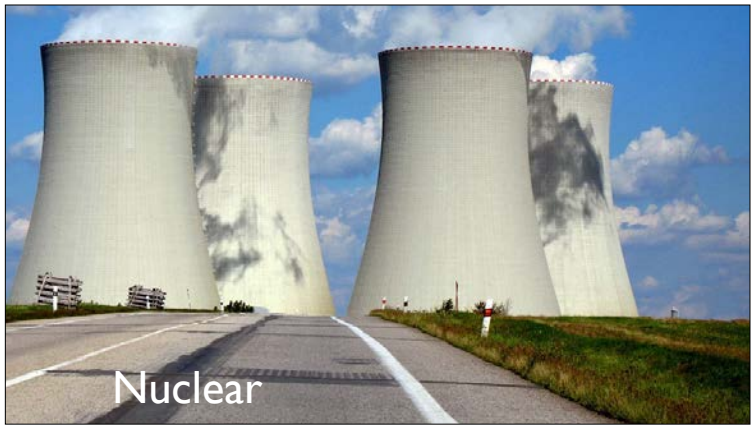

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Nonrenewable Resources

14

Renewable Resources

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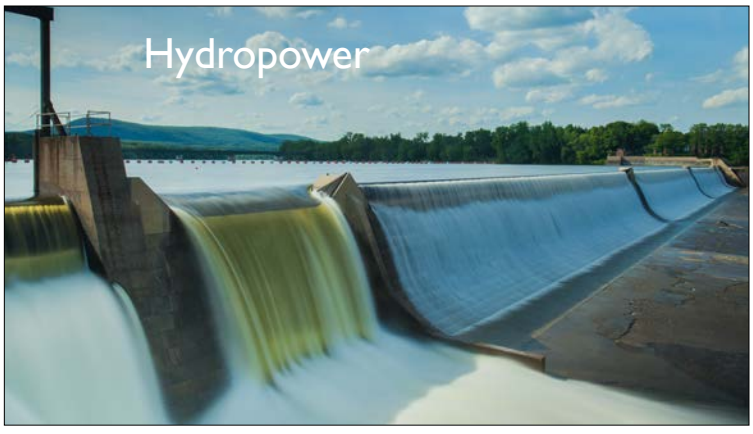

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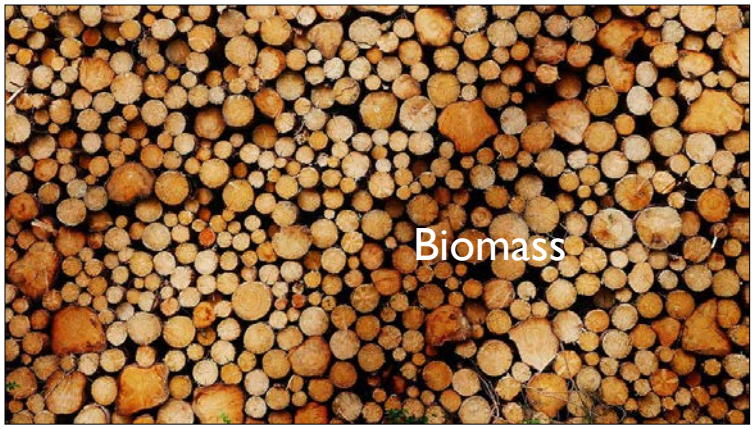

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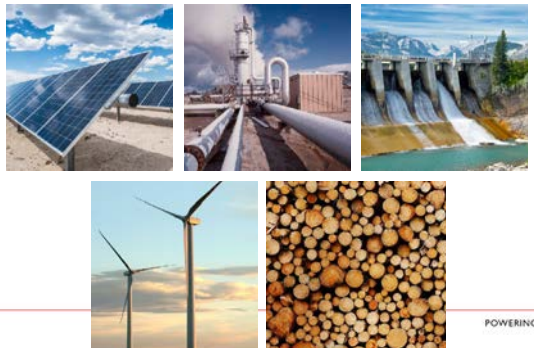
Renewables



POWERING YOUR GREATNESS

21

POWERING YOUR GREATNESS

22

It's time to play LINGO!

23

energy

24

natural gas

The blue flame of n_ _ _ _ _ _ _ is a nonrenewable resource.

25

natural resource

Anything we use that comes from the earth or the s_ _ _ _ _ _ _ is a n_ _ _ _ _ _ r_ _ _ _ _ _ _ _.

26

27

28

Pacific Power

Electric generation by energy source

Coal 47%

Renewables 26%

Other sources 9%

Natural gas 18%

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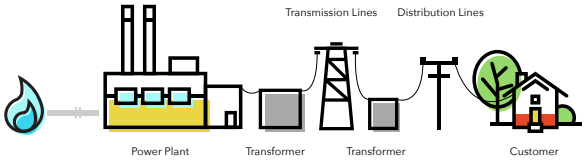
29

How many people does it take to turn on a light bulb?

30

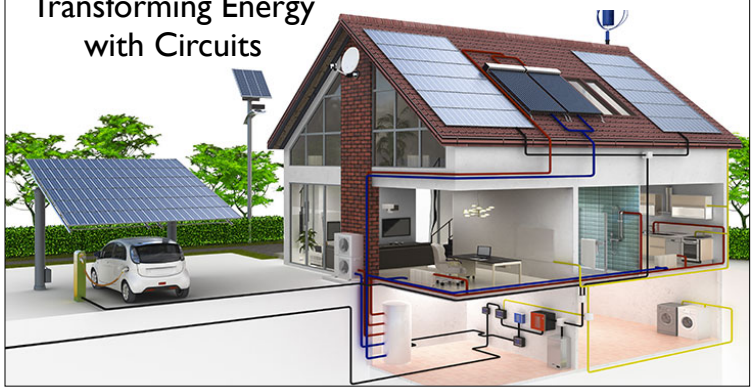
Electric Generation



POWERING YOUR GREATNESS

31

Transforming Energy with Circuits



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What do we need?

An energy source	A conductor to carry electrical energy	A load to use the energy
example: battery or wall outlet	example: wire	example: light bulb

33

Open and Closed Circuits

34

Transforming Energy

Conductors
allow electricity to flow through them.

Insulators
resist the flow of electricity.

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35

Safety Quiet Quiz

36

37

38

39

40

41

42

43

It's time to play LINGO!

44

Renewable

R_____ that can be naturally replaced.

45

Nonrenewable

N_____ that cannot be replaced quickly or not at all.

46

water

Keep all electrical appliances in your bathroom away from water.

Remember you are a conductor.

47

Oil

A source used to produce energy. O__

48

Energy Efficiency

Using less energy to accomplish the same amount of work.

Technology

+

Behaviors

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Caitlynn Power

POWERING YOUR GREATNESS

50

Caitlynn Power

POWERING YOUR GREATNESS

51

Home Efficiencies

What can you do to be Wattsmart?

52

Be the energy expert in your home.

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Caitlynn Power

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55

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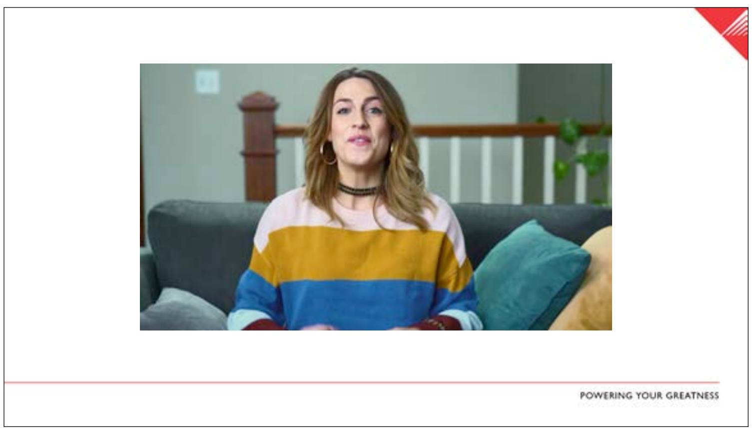

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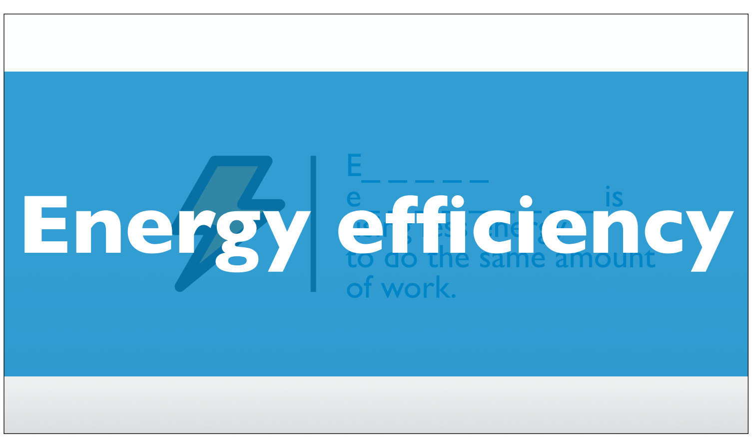

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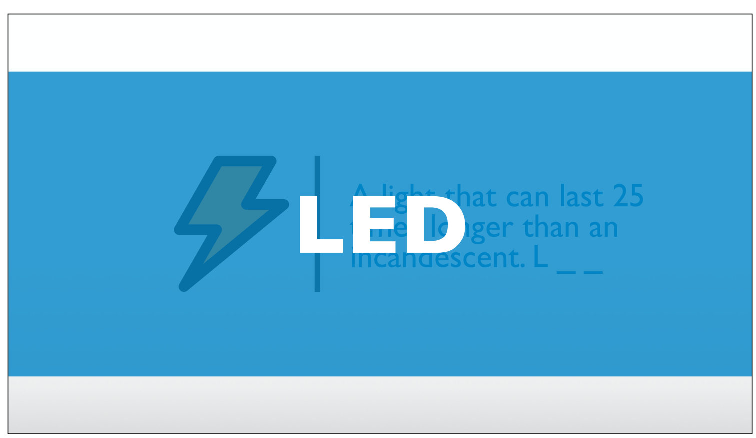


60

phantom load

Electricity consumed by an electronic device [illegible] in standby mode.

p_ _ _ _ _ _ l_ _ _

61

full load

Make sure you have a f_ _ _ before starting your dishwasher.

62

What have we done today?

- Learned why energy is important
- Discussed energy and where it comes from

63

Engage in energy efficiency

Review your **Be Wattsmart, Begin at home** booklet with your family.

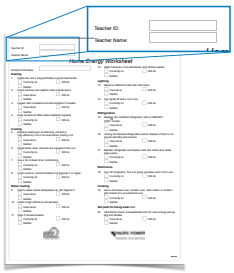
64

Complete the

H ome

E nergy

W orksheet



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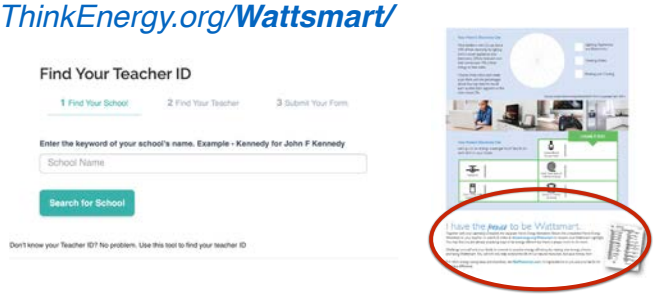
Online Worksheet

*ThinkEnergy.org/**Wattsmart/***



66

Receive your very own Pacific Power LED nightlight.

POWERING YOUR GREATNESS

67

POWERING YOUR GREATNESS

68

YOU have the *power to be* Wattsmart!

POWERING YOUR GREATNESS

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Implementation Steps for Presenter Option

1 Verify you have received:

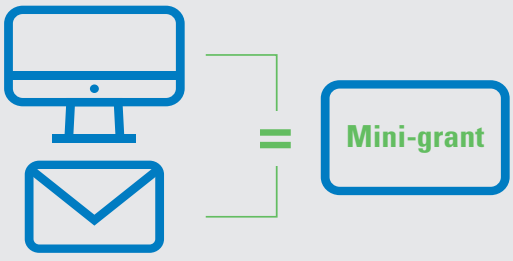
- *Teacher Materials Folder* (notice your teacher ID in the upper left corner)
- Your **Be Wattsmart, Begin at home** *Teacher Guide*
- *Home Energy Worksheets* (HEWs) for you and your students
- **Be Wattsmart, Begin at home** family booklets
- Set of letters to go home with students
- Wattsmart nightlights (student incentive for completing the HEW)

2 After the presentation, distribute to each student a/an:

- **Be Wattsmart, Begin at home** family booklet
- HEW (Write your teacher ID on each worksheet before you send home.)
- Letter to go home

3 Final steps:

- Reward students with a Wattsmart nightlight when they complete their worksheet on paper or online at **thinkenergy.org/Wattsmart**.
- HEWs submitted online can be verified through the teacher portal. (**nef1.org/programs/teacher-lookup**) with your teacher ID.
- Have each student sign the *Thank You Card* to Pacific Power.
- Mail any completed paper HEWs and the *Thank You Card* in the postage paid envelope (found in your materials folder) by December 2, 2022.



WATTSMART® BEGIN AT HOME

National Energy Foundation® cultivating energy literacy

PACIFIC POWER POWERING YOUR GREATNESS

WA

Attention Teachers

Return your student *Home Energy Worksheets* (HEWs) and receive a **$25 to $50** mini-grant for classroom use, depending upon participation. Students may submit worksheets online or return the completed survey to you. See the *Implementation Steps* for additional HEW online information.

80% or greater return of registered students' HEWs = $50
50% – 79% return of registered students' HEWs = $25

Postmark due date:
December 2, 2022

Offer open only to teachers participating in Be Wattsmart, Begin at home. Certain restrictions may apply. Good while grant funding is in place. *Home Energy Worksheets* must be completed for eligibility. For more information, contact Sarah Richards at sarah@nef1.org.

NEF™

PACIFIC POWER
POWERING YOUR GREATNESS

Dear Family,

The **Be Wattsmart, Begin at home** program assists teachers and families to learn about energy, discuss important energy topics and engage in energy efficiency actions now. Your child has participated in a presentation addressing natural resources, energy basics and energy efficiency. Your participation in this program will help you be Wattsmart, enhance energy efficiency in your home and help save money on your utility bills. Here are three simple ways that you can help:

- Review this **Be Wattsmart, Begin at home** booklet with your child.
- Assist your child with completing the activities on page 7.
- Have your child complete the ***Home Energy Worksheet*** (HEW) online at **thinkenergy.org/Wattsmart** or return it to your child's teacher.

Thank you for being Wattsmart and for your participation!

What's inside?

This booklet is divided into three sections that will give you the power to:

1. **Learn** about sources of energy, how they get to your home and why they are important in your life.
2. **Discuss** Wattsmart energy efficiency tips that will help you use energy wisely and save money.
3. **Engage in energy efficiency** by determining how energy can be saved in your home through a simple audit activity and the HEW.

About Pacific Power

Pacific Power is committed to the delivery of reliable electric service that's safe, low-cost and increasingly from clean, renewable resources. Serving more than 700,000 customers in Washington, Oregon and California, the company is one of the lowest cost energy producers in the nation. Pacific Power is moving toward a sustainable energy future that includes increased use of solar, wind and other renewable resources; and provides customers with more choices to meet their energy needs.

About the National Energy Foundation

The National Energy Foundation (NEF) has empowered millions of students and families to make energy wise choices for over four decades through its nonprofit mission to cultivate and promote an energy literate society. A community of volunteer classroom teachers and staff educators brings unique educational integrity to NEF's K - 12 energy education programs, with many programs resulting in national recognition like the award winning energy efficiency program, Think! Energy. Energy utilities and organizations partner with NEF to address critical topics such as efficiency, safety and electric transportation. NEF recognizes the importance of education in making informed energy decisions.

I have the *power* to be Wattsmart.

- Being Wattsmart is all about taking steps to save energy, which in turn can help you save money.
- You have the power to become more energy efficient. Pacific Power can help with Wattsmart programs and incentives for homes and businesses. Saving energy also saves money and is good for the environment.

I have the power to *learn.*

The importance of energy:

Energy is the ability to do work or produce change. Virtually everything we do or use at work and home uses energy.

- Heating and cooling systems
- Computers
- Electronic equipment such as gaming and entertainment systems and TVs
- Charging electronic tablets, music players and cell phones
- Appliances
- Lights
- Food storage and preparation
- Security systems

Where does energy come from?

Our energy comes from natural resources. There are two general categories of natural resources: nonrenewable and renewable. A nonrenewable resource is not capable of being renewed or replaced or takes a very long time to replace. A renewable resource is capable of being renewed or replaced.

Primary natural resources are used to convert energy into electricity. They can be either nonrenewable or renewable.

Nonrenewable examples are:

Coal is the most abundant nonrenewable energy source in the world. The United States has more coal reserves than any other country in the world, but the reserves are shrinking.

Oil can be both refined and unrefined. Refined oil is transformed into petroleum products and unrefined oil remains as crude oil.

Natural Gas is usually captured alongside oil deposits and is a major source for electrical generation.

Uranium is the fuel most widely used by nuclear plants. Nuclear energy is the energy inside the nucleus (core) of the atom of uranium.

Renewable examples are:

Solar is energy from the sun.

Wind is energy from the wind captured by a group of wind turbines (generators).

Geothermal is energy derived from the heat of the earth.

Hydropower is energy from water that generates electricity.

Secondary energy resources are created by using nonrenewable and renewable resources of energy.

Electricity is the most abundant secondary energy resource used. It is the flow of electrical power or charge. It occurs in nature as lightning and static electricity. A generator uses energy resources to create mechanical energy that is then converted into electrical energy.

Energy efficiency

Energy efficiency is using less energy to accomplish the same amount of work. We call it being Wattsmart. There are many technologies we can use today that decrease the amount of energy needed to do work. Good examples are ENERGY STAR® products and LED lighting.

You can save even more money if you start thinking about using energy wisely. Try turning off the lights when you leave the room, take shorter showers or turn off your electronics when you are not using them.

Using electricity

For more than 100 years, electricity has made our homes more comfortable and industries more productive. Today electricity is powering a world of electronics.

How is electricity generated? It begins with a fuel that heats water and turns it to steam. The steam drives the turbine that turns the generator motor to produce electricity.

How is electricity transmitted? Once the electricity is produced, the current flows from the generator to the power plant transformer where the voltage is increased to boost the flow of the electric current through the transmission lines. The transmission lines transport the electricity to Pacific Power's substations where the voltage is decreased. Power lines then carry the electricity from the substations to be used in our homes and businesses.

ELECTRICAL GENERATION		
Energy Source	Pacific Power (2021 Basic Fuel Mix)*	United States (U.S. EPA, 2021 data)
Natural Gas	18.4%	38%
Coal	46.8%	22%
Nuclear	0.00%	19%
Petroleum	0.00%	.5%
Other/misc.	9.2%	.3%
Renewables (total)	25.6%	20%
Hydropower	3.9%	6.3%
Wind	15.2%	9.2%
Biomass	0.4%	1.3%
Solar	5.8%	2.8%
Geothermal	0.3%	.4%

**This information is based on Federal Energy Regulatory Commission Form 1 data. Pacific Power's "basic fuel mix" includes owned resources and purchases from third parties. It is based on energy production and not resource capability, capacity or delivered energy. All or some of the renewable energy attributes associated with wind, solar, biomass, geothermal and hydro facilities in the fuel mix may be: (a) used to comply with renewable portfolio standards or other regulatory requirements, (b) sold to third parties in the form of renewable energy credits and/or other environmental commodities or (c) not acquired. The 2021 fuel mix includes energy production associated with 157 megawatts of solar resources acquired through customer partnerships supported by a customer's purchase of 100% of renewable energy attributes generated by those solar resources.*

I have the power to *discuss* energy use to help save money and improve the environment.

Saving energy happens in two ways. First, you can use less energy through wise behaviors that conserve energy. Second, you can install energy-efficient products and appliances that use less energy to accomplish the same task. Let's talk about the following areas of your home that have the largest potential to save energy.

Home heating and cooling

- Install a programmable thermostat or smart thermostat. Set your thermostat to 78 F or higher in the summer and 68 F or lower in the winter.
- Make sure your house is properly insulated. If you have less than 6 inches of insulation in your attic, you would benefit from adding more.
- You can save up to 10% on your energy bill by reducing the air leaks in your home with caulking and weather-stripping.

- To help your furnace run more efficiently and cost-effectively, keep your air filters clean.
- For windows with direct sunlight, close your blinds in the summer to keep the heat out. Open them on winter days to let the warmth in.
- Small room fans are an energy-efficient alternative to air-conditioning.
- For information about energy saving programs and cash incentives, visit **Wattsmart.com**.

Water and water heating

- Check your faucets for leaks that can cost you hundreds of dollars each year.
- Install a water-efficient shower head and save money on your utility bills and more than 2,300 gallons of water per year.
- Set the water heater at 120 F.
- Install faucet aerators to decrease water use.

Lighting

- Let the sun shine in. Use daylight and turn off lights.

- Replace your incandescent bulbs with LEDs (light-emitting diodes) and save about $225 in energy costs each year. These bulbs use up to 90% less energy than incandescent bulbs and last much longer.
- Use lighting controls such as motion detectors and timers.
- Turn off lights when you leave the room.
- Always use the lowest wattage bulb that still gives you the light you need.
- Keep your light bulbs clean. It increases the amount of light from the bulb and reduces the need to turn on more lights.

Electronics

- Turn off your computer and game consoles when not in use.
- Home electronics are made to turn on and off many times. Always turn them off to save energy.
- Electronics with the ENERGY STAR® label use as much as 50% less energy while providing the same performance.
- Beware of phantom loads which continue to draw electricity when they are plugged in but not in use. Examples are phone chargers, electronic games and cable boxes.
- Use advanced power strips for household electronics. One button will turn off multiple appliances, which conserves electricity.

Refrigerators and freezers

- When looking to replace your old refrigerator, do so with an ENERGY STAR® model, which requires approximately 9% less energy than conventional models and provides energy savings without sacrificing the features you want.
- Clean door gaskets with warm water or a detergent that leaves no residue.

Dishwashers

- Only run dishwashers when full and use the air-dry or no heat-dry settings.
- ENERGY STAR® dishwashers use less energy than the federal minimum standard for energy consumption.
- Try running your dishwasher before 3 p.m. or after 8 p.m. to avoid peak demand.

Laundry

- Buy a moisture sensitive dryer that automatically shuts off when clothes are dry.
- Use a drying rack whenever possible.
- To avoid peak demand, wash and dry clothing before 3 p.m. or after 8 p.m. when possible.

Cooking

- Use a microwave oven, toaster oven or slow cooker instead of a conventional oven.
- Use the right size pan for the stove top element.
- Cover pans with lids to keep heat from escaping.

Reduce

- Use less.
- Purchase products with little packaging.

Reuse

- Use something again.
- Reuse a box or a grocery bag.

Recycle

- Make something into another new item.
- Participate in the recycling programs in your community.

I have the power to *engage* in energy efficiency.

Families, be Wattsmart and watch the energy savings add up.

An individual with a combined electric and heating fuel bill of $2,500 per year could save 20% or $42/month by using these and other energy efficiency tips. That is like getting a pay raise without having to work harder or longer.

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Your Home's Electricity Use

Most families in the U.S. use about 54% of their electricity for lighting and to power appliances and electronics, 32% to heat and cool their homes and 14% of their energy to heat water.

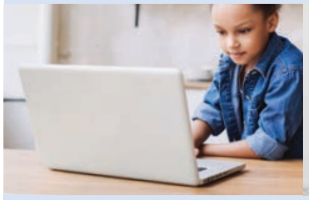
Choose three colors and create a pie chart with the percentages above. You may need to round each number. Each segment on the chart shows 5%.

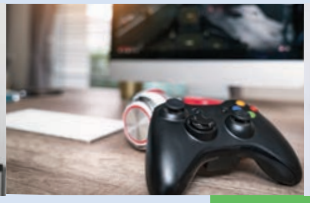
Lighting, Appliances and Electronics

Heating Water

Heating and Cooling

(Source: *eia.gov/todayinenergy/detail.php?id=36412*, accessed April 2022)



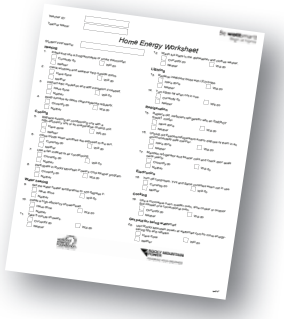



Your Home's Electricity Use

Let's go on an energy scavenger hunt! Search for each item in your home.

	I FOUND IT HERE.
Water-efficient Shower Head	
Ceiling Fan	Caulk, Foam Spray or Weather-stripping
Door Sweep Under Exterior Doors	Dishes or Clothes Air-drying

I have the *power* to be Wattsmart.



Together with your parent(s)/guardian(s), complete the separate HEW. Return the completed worksheet to your teacher or submit it online at **thinkenergy.org/Wattsmart** to receive your Wattsmart nightlight. You may find you are already practicing ways to be energy efficient but there is always room to do more.

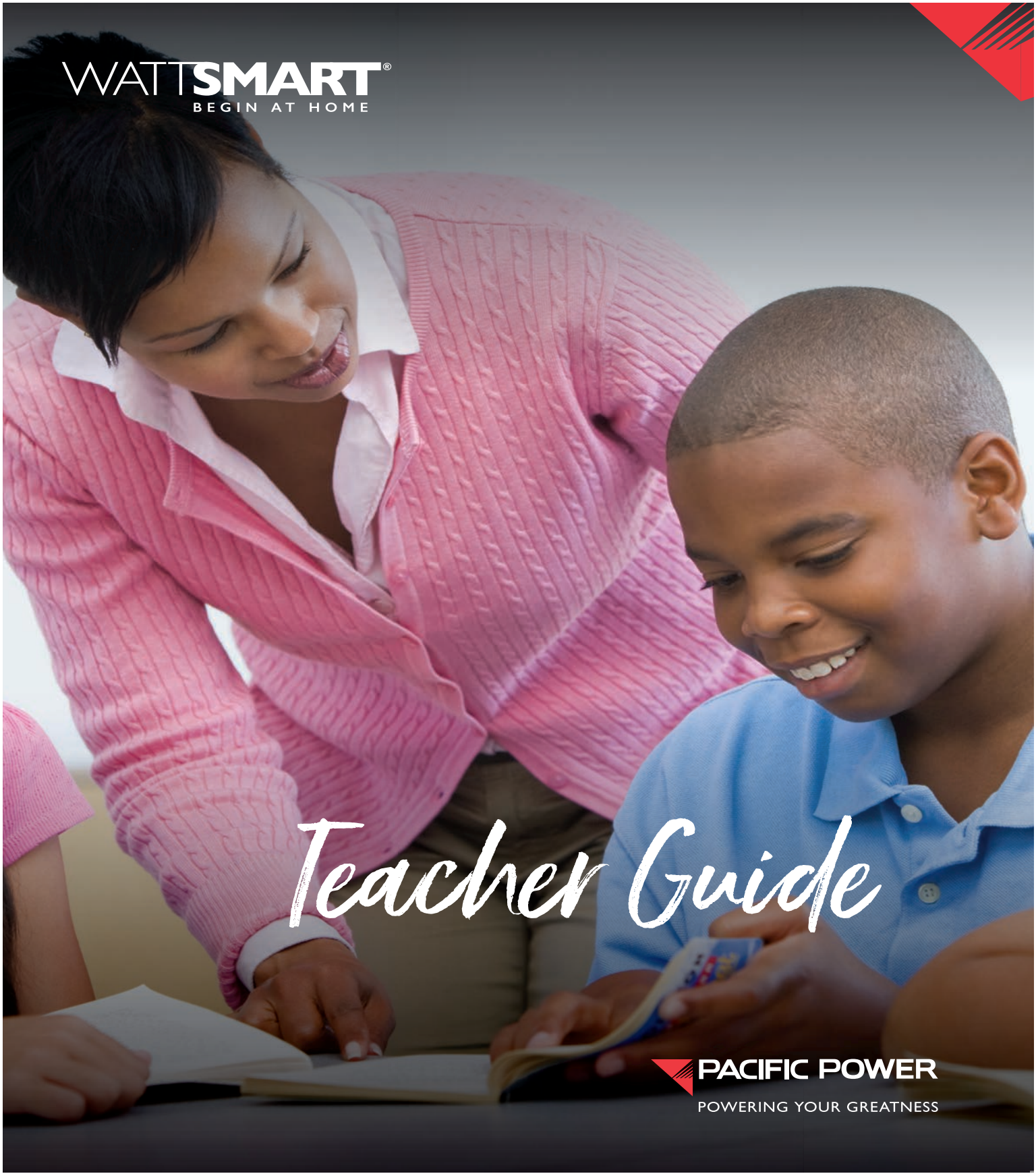
Challenge yourself and your family to commit to practice energy efficiency by making wise energy choices and being Wattsmart. You will not only help extend the life of our natural resources, but save money too!

For other energy saving ideas and incentives, visit **Wattsmart.com**. Congratulations to you and your family for making a difference.

WATTSMART®
BEGIN AT HOME

National Energy Foundation®
cultivating energy literacy

PACIFIC POWER
POWERING YOUR GREATNESS



Welcome to Be Wattsmart, Begin at home

This program teaches the importance of energy and assists students and their families in saving energy in their homes. For teachers, Be Wattsmart, Begin at home reinforces important electrical concepts from your curriculum.

This *Teacher Guide* was designed to supplement program instruction. A variety of tools have been provided to allow you to format Be Wattsmart, Begin at home to meet your instructional needs. These tools include:

- General guidelines and activity suggestions
- Classroom activities to further the impact of lessons
- Additional fun and interesting activities for students
- Activities containing STEM-correlated curriculum for your classroom

About Pacific Power

Pacific Power is committed to the delivery of reliable electric service that's safe, low-cost and increasingly from clean, renewable resources. Serving more than 700,000 customers in Washington, Oregon and California, the company is one of the lowest cost energy producers in the nation.

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Table of Contents

WATTSMART BEGIN AT HOME

STEM Connections

Activity	Science				Technology			Engineering						Math			
	Science as Inquiry	Energy Sources, Forms and Transformations	Science and Technology	Personal and Social Perspectives	Productivity Tools	Communication Tools	Research Tools	Problem-solving and Decision-making Tools	Historical Perspective	Design and Modeling	Invention and Innovation	Test Design and Troubleshooting	Use and Maintain	Numbers and Operations	Measurement	Data Analysis and Probability	Connection to the Real World
Pass the Sack		•		•													
Get a Clue!		•		•			•							•		•	•
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I

Activity: Pass the Sack

Objective
Students will demonstrate the difference between renewable and nonrenewable resources and the need for conservation of resources.

Curriculum Focus
Science
Social Studies

Materials
- Two different kinds of candy or other objects students find desirable
- Sack to hold candy, such as a gallon size plastic bag

Key Vocabulary
Nonrenewable resource
Renewable resource

Next Generation Science Correlations
4-ETS1 – 2
4-ESS3 – 1-2
4-ESS3.A
5-ETS1 – 2
5-ETS1 – 1
5-ESS3 – 1
MS-ESS3 – 4
MS-ESS3.A

Introduction

Statistical research confirms world consumption of natural resources is increasing every year. Continued population growth ensures that demand will continue to increase for renewable and nonrenewable energy resources necessary to maintain our way of life. This creates problems for future availability of nonrenewable resources. Nonrenewable resources are just that, resources that cannot be renewed. For example, a resource used at our present rate might last about 100 years. Factor in population growth and increasing reliance on technology, and that resource may last only 79 years.

In this activity, two different types of candy (or other objects students would like) will represent resources. One type of candy will represent renewable resources and the other will represent nonrenewable resources.

Procedure

1. Before class, count out enough candy so there is one piece per student (some of each type of candy, with less of one so it will run out faster). Put it in the sack or bag. Save the remaining candy. If you have a very polite class, count enough candy for half of the class. **You want the contents to run out before everyone gets candy!**
2. Tell students you will demonstrate how resources get used over time by playing "Pass the Sack." Show students the sack and explain that when they get the sack, they should take some energy and pass the sack to the person next to them.
3. Before passing the sack to the first student, review renewable and nonrenewable resources. Have students give examples of each as you hand the sack to a student.
4. While this discussion is taking place, allow students to pass around the bag of candy without any rules about how many pieces students may take. Occasionally, add four or five pieces of **one** type of candy you are using. This will be your renewable resource. The sack will be empty before it reaches all the students.
5. Ask students who did not get any candy how they might obtain energy from other students. What if each student represented a country? How do countries obtain resources? Do they trade, barter (trade for goods), buy (trade for currency), invade and take or go to war? What effect did the availability of candy have on relationships between students? What effect might the availability of natural resources have on the relationship among nations, provinces, states, people, standards of living and quality of life?

6. Explain how our resources are like the candy. Which type was the nonrenewable? How could you tell? (No more was added to the bag once it was being passed around.) Which type was renewable? How could you tell? (It was added periodically to renew it.)

7. Point out that resources have limits just like the candy. Emphasize that many resources, such as fossil fuels, are nonrenewable and are being consumed faster than they are being replaced by nature. Discuss the fact that it would be more difficult for students to eat the candy if they had to search the room to find it instead of just taking it from the sack. Energy companies must seek resource deposits and obtain rights to drill or mine for them; they do not just magically appear.

8. Point out that renewable resources also have limitations. They may not generate electricity as reliably as nonrenewable sources. The amount of energy produced may vary with weather and location.

9. Plan how to pass out the remaining candy.

Discussion

- Should rules be established to determine how the candy is distributed?
- Do oil, coal and natural gas companies have rules/regulations that must be followed to find resources?
- Should there be rules and regulations on how much oil, coal and natural gas people use?
- How do the class' social decisions influence the availability of candy?

To Know and Do More

Go to **eia.gov/kids** to access games, tips and facts for kids to learn about renewable energy and energy efficiency.

Discuss whether or not it is possible to run out of a renewable resource. Wood and fresh water are examples of renewable resources that can be used faster than nature can replace them.

Activity: Get a Clue!

Objective
Students will identify and use vocabulary words related to the topic of energy sources in a game situation.

Curriculum Focus
Science
Social Studies
Language Arts

Materials
- Index cards for energy source word clues
- Markers

Key Vocabulary
biomass, coal, energy, fossil fuels, garbage, geothermal, hydroelectric, methane, natural gas, nonrenewable energy, nuclear energy, ocean tides, ocean waves, oil, oil shale, petroleum, plants, renewable energy, solar (sun), steam, uranium, water, wind, wood

Next Generation Science Correlations
4-ESS3 – 1
MS-PS1 – 2
MS-ESS3.A

Introduction
Energy is essential in our daily lives. We depend on energy for our heat, air-conditioning, lights, clothing, food, transportation and communication. Where does this seemingly endless supply of energy come from?
There are many sources from which we get our energy. Some are endless or renewable, such as energy we get from the sun, wind and water. Other sources are limited or nonrenewable, such as fossil fuels like coal, oil and natural gas. Some sources are only available in certain areas such as geothermal features or uranium. Some sources are readily available but difficult to harness, such as ocean tides. Others are expensive to extract or might present environmental concerns.
Scientists are constantly searching for sources of energy and more efficient ways to use them. Many sources of energy have been used for hundreds, even thousands of years. Sources such as coal and natural gas can be burned to produce energy. Wind can be harnessed as well as the sun's power (solar energy). In the late 1800s it was discovered that these sources could be used to generate electricity and distribute it as needed. In the middle 1900s fuel cells and photovoltaic cells were discovered. These are just a few of the sources and their uses we take advantage of each day.

Procedure
1. The success of this activity depends upon adequate student preparation. Class time should be spent learning to spell and define the following energy source words:

geothermal	coal	nuclear energy	natural gas
oil	solar	wind	wood
fossil fuels	gasoline	ocean waves	biomass
oil shale	methane	uranium	battery
steam	hydroelectric	petroleum	garbage
ocean tides	plants		

2. Divide the class into two groups of approximately equal ability. Choose one student from each team to give clues and have them sit at the front of the room. Each clue giver will be giving clues to their team.

3. You may want to use the list of suggested words included or add your own choices.

4. How the game is played:
    a. Each of the clue givers is shown an energy source word.
    b. The clue givers then give clues alternately to their teams as to the identity of the energy source word. Some teachers allow only one word clue to be given, or you may prefer to allow more clues within a certain time period, such as 15 seconds. (Have one student be the timekeeper.)
    c. After giving a clue, the clue giver chooses someone on their team to guess the energy source word. If that team member guesses the correct word, their team scores (see step f) and a new round begins using a new energy source word. Alternately, team members guess the word by order of seating rather than being chosen by the clue giver to guess the word.
    d. If the team member guesses incorrectly, the turn goes to the other team's clue giver who gives a new clue for the same energy source word to a member from their team.
    e. After the word has been guessed correctly by one team or the other, the new word goes first to the clue giver who did not start the previous round.
    f. Scoring is as follows:
        - 10 points for the team guessing the word correctly on the first clue
        - 9 points if the correct word is guessed on the second clue
        - 8 points if the team guesses the energy source word after hearing the third clue, etc
    g. New clue givers should be chosen from each team after every three or four rounds have been played.

Discussion

Have students categorize the energy source words as either renewable or nonrenewable. A sample chart is provided below. Use the words and definitions learned to create an energy crossword puzzle. Puzzle creation software is readily available on the internet.

Renewable	Nonrenewable
geothermal	oil, petroleum
ocean tides, waves	nuclear energy, uranium
hydroelectric	coal
biomass, plants, wood	natural gas
solar	methane
garbage	gasoline
wind	battery

5

To Know and Do More

Write the energy source words on index cards. (Duplicate the cards, if necessary, to have one for each student.) Tape one card on the back of each student; they should not know what their own card says. Allow students to ask each other yes or no questions to try to identify their energy source. Once they have identified their own energy source, they still continue answering others' questions. As students identify their energy sources, they may remove the card from their back and place it on their chest. Have students research the energy sources used to generate electricity in your area. Sources of information include your local utility provider and government agencies such as the United States Energy Information Administration (**eia.gov**). Discuss the reasons behind the energy sources used in your area, such as costs of transporting fuels, availability of sunlight or wind, etc.

Career Awareness Activity

Using the following careers or others you might think of, have students match them with the correct source of energy. Some careers will match with more than one energy source.

Meteorologist (wind)
Reactor operator (nuclear)
Hydrologist (geothermal)
Electrician (all sources)
Geologist (geothermal, hydroelectric, coal, oil, natural gas)
Physicist (nuclear)
Tank truck driver (gasoline, oil)
Welder (all sources)
Pipe fitter (all sources)
Plumber (all sources)
Accountant (all sources)
President and CEO (all sources)
Engineer (all sources)

Choose some energy related careers and use them as tiebreakers or bonus rounds in your energy source word game.

WATTSMART BEGIN AT HOME

Activity: Get Your Motor Running

Objective
Students will experience energy transformations as they build a DC motor.

Curriculum Focus
Science
Technology

Materials
- C or D dry cell batteries
- Ceramic magnets
- Large paper clips
- Enamel coated wire of varying thicknesses
- Sandpaper
- Tape or rubber bands (optional)
- Copies of "Student Sheet: Get Your Motor Running"

Key Vocabulary
Alternating current (AC)
Direct current (DC)
Electrical circuit
Electromagnet
Motor
Resistance

Next Generation Science Correlations
4-ETS1 – 1-2
4-PS3 – 2-4
MS-PS1 – 6
MS-PS2 – 3, 5
MS-PS3 – 1-5

Recommendation

This is a STEM rich activity requiring substantial time, supplies and student skill in problem solving. If resources are limited, the activity may be used as a teacher demonstration or as group work rather than an individual assignment.

Introduction
In this activity, students investigate multiple energy transformations while constructing a simple DC motor. The most difficult part of this activity is building a properly shaped coil. You may wish to build the coils for students in advance, then keep them for future use.

Procedure

1. Explain to students that a motor is a device that transforms electrical energy into mechanical energy. Motors are used in many household appliances such as hair dryers, vacuum cleaners and blenders.
2. Place students in pairs or small groups and provide them with their materials. Each group will need approximately 22 inches of wire, one battery, two paper clips and magnets. The number of magnets needed will vary with the strength of the magnet and the age of the batteries. Two small ceramic magnets are usually sufficient. To save time, you may want to make a class set of coils in advance so students just have to place the coil into the paper clips.
3. Pass out "Student Sheet: Get Your Motor Running" and allow students to work through the motor design and answer the questions. Students will have to be persistent to get the coil to turn. Stress the importance of the coil being straight and level to get the motor to work properly.
4. As a class, discuss the importance of each piece of the motor and trace the energy conversions needed to make the motor work using batteries (chemical to electrical to mechanical, sound and thermal). Note that the coil will show a preference to spin in one direction.
5. If time permits, allow students to investigate on their own, the effect of different variables on the motor such as the gauge (thickness) of wire used, number of magnets, number of windings in the coil, type of battery used, etc. As a class, determine which variables affected motor

performance and why that may be. For example, what are the advantages and disadvantages of using a heavier gauge of wire? What is the best balance between weight and electrical resistance? How do you keep the motor cost-effective? Students should formulate a question, make a hypothesis and design an experiment to test that hypothesis.

6. Have students share their observations and conclusions on the variables which affect motor performance.

To Know and Do More

1. Allow students to view motors taken from household appliances and compare them to the motors they built. How do DC and AC motors differ?
2. In addition to demonstrating energy transformations, this activity can be used to show an electrical circuit, assist in a discussion about DC versus AC circuits, show an application of an electromagnet (the coil of wire) and let students experience heating due to resistance of a wire!

Answers to Questions on "Student Sheet: Get Your Motor Running"

1. The coil should wobble and eventually spin if it has been balanced correctly.
2. The battery contains chemical potential energy, which is converted to electrical kinetic energy in the paper clips and coil. The electricity is then converted to mechanical kinetic energy in the movement of the coil, thermal kinetic energy (heat) due to resistance in the wire and a bit of sound energy. You may want to point out that heat and sound are not usable forms of energy, so the energy transfer is not 100% efficient.
3. It will spin in only one direction (direct current).
4. Variables include the number of turns on the coil, thickness of the wire, strength of the permanent magnets and voltage of the battery.
5. By increasing any of the above factors, you increase the speed of the motor. New batteries work better than old ones, but they lead to much more thermal energy.

WATTSMART BEGIN AT HOME

Student Sheet: Get Your Motor Running

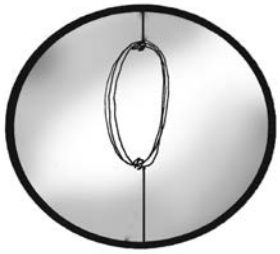
This activity lets you create your own DC motor and see many energy transformations firsthand.

Materials

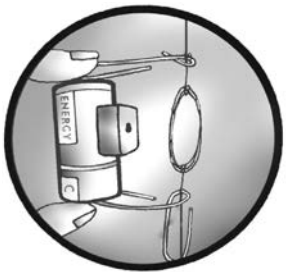
C or D dry cell battery, two large paper clips, ceramic magnet, fine sandpaper, enamel coated wire, wire cutters or scissors, rubber band or tape (optional)

Procedure

1. Cut about 22 inches of wire and wrap it around the battery five times (be sure to leave wire sticking out on both ends).
2. Trim the ends of the wire so that they are about an inch long and stick out from opposite sides of the coil as shown to the right.
3. Remove the coil from the battery and wrap the ends around the coil two or three times to help hold the shape. It is very important that the ends are directly opposite each other as in the diagram.
4. Using sandpaper, remove the insulation coating from the ends of the wire from coil to tips. The wire should now be shiny. Be sure the ends are straight as shown in the top picture. Crooked coils will not work!
5. Bend the paper clips into an L shape (be sure to bend it in the direction that forms a loop in the clip) and place the longer end of the clips on the ends of the battery, sticking up into the air as high as possible. You can use a rubber band or tape to hold the paper clips or just squeeze them with your fingers.



6. Place the magnet on the battery as shown in the picture at right and put the ends of the coil through the ring formed by the paper clips. **Do not** bend the coil when inserting it. Be sure the coil is level on both sides and can spin without hitting the magnet.



Questions

1. What happens to the coil when the magnet is added to the battery?

2. What energy transformations do you see and feel? Write the types and forms of energy beginning with the battery and ending with the coil.

3. Will the coil spin in either direction or just one?

9

4. What variables affect the speed of the coil?

5. How could you make the coil spin faster?

To Know and Do More

1. Pick one of the variables from your answer to question 4 and design an experiment to test the outcome of changing this variable. Be sure to record your independent variable, dependent variable, variables controlled, data table and results in the space below. How do your conclusions compare to those of your classmates? How would you determine if your experiment and those of your classmates have valid results?

2. Research how the motor was invented and developed. What scientific principles does it use? What household devices contain motors? How do DC and AC motors differ?

WATTSMART® BEGIN AT HOME

Activity: The Art of Circuits

Objective

Students will learn about conservation of energy and energy transfer by experimenting with electrical circuits.

Curriculum Focus

Science
Social Studies
Language Arts
Art

Materials

- Playdough® or homemade salt dough
- 9V batteries
- 9V battery clips with red and black cables
- 2V LED miniature light bulbs
- Insulating material: cardboard, packaging plastic or dough made from sugar, not salt (optional)

Key Vocabulary

Energy transfer
Electric current
LED (light-emitting diode)
Electric circuit
Insulator
Conductor

Next Generation Science Correlations

4-PS3 - 2
4-PS3 - 4
4-PS3.A-B, D
4-ETS1 - 1
4-ETS1.A
5-ETS1 - 1
5-ETS1.A
MS-PS3 - 3
MS-PS3.A-B
MS-ETS1 - 1
MS-ETS1.A

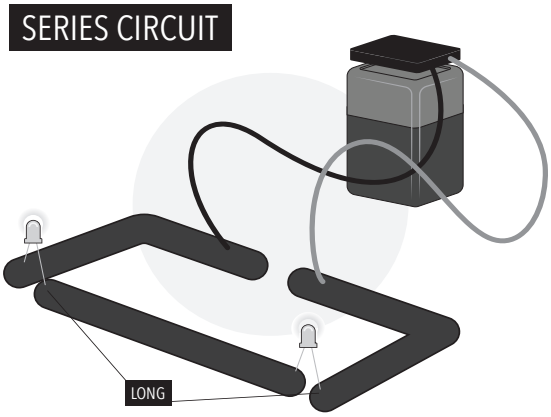
Introduction

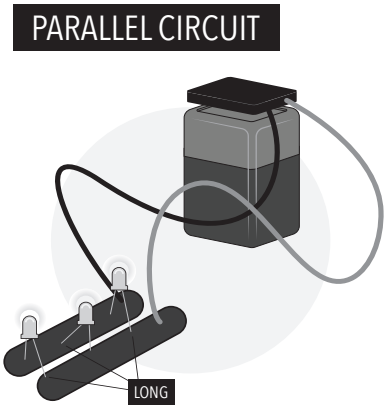
Materials that allow a flow of electric current to pass through them more easily are called conductors. Aluminum, silver, copper and water are examples. Insulators block the flow of electricity. Nonmetallic materials, such as rubber, plastic, wood, cloth and dry air are insulators. An electrical circuit is a path of conductors through which electric current flows. Energy can be transferred from place to place by electric current.

In this activity, students will use salt dough, which is a conductor, to design circuits which will transfer electrical energy. If they are successful, the electricity will be transformed to light and heat energy in a miniature LED bulb.

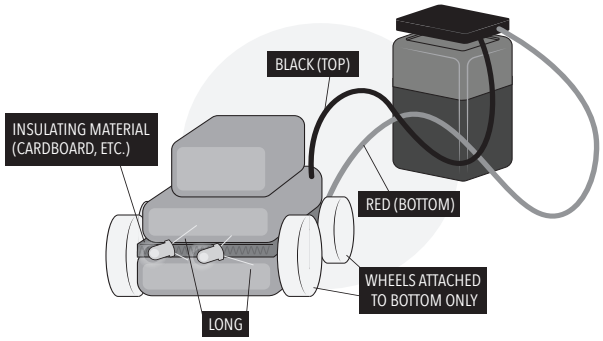
Procedure

1. Introduce students to their materials:
   a. Attach the battery to a battery clip with red and black cables. The red lead is the positive terminal and the black lead is the negative terminal.
   b. Examine the LED bulb. Two wires (or legs) extend from the bulb. The longer wire is the positive side of the LED and the short wire is the negative side. The LED should only be connected to dough, never directly to the battery terminals, which will cause the bulb to burn out.
2. Tell students that electricity can only go through the circuits they will create in one way. The positive terminal of the battery (red lead on battery clip) must be nearest a positive (long) leg of the LED. A battery pushes electricity around the circuit through the positive leg and out the negative (short) leg, then repeating through the next positive leg (if there is more than one LED in the circuit).
3. Explain that electricity will take the path of least resistance. It is easier for electricity to travel through the dough than through the LED. If two pieces of dough are touching, the LED will not light.
4. Challenge students to design a simple circuit like the ones on the next page.





If time allows, have students create a circuit work of art like the one below. Since the conductive dough cannot touch, use insulating material between layers.

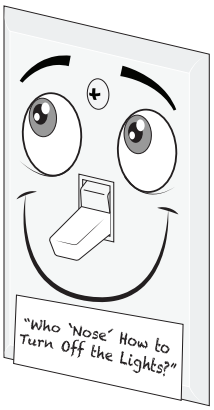


Discussion

- How does your dough circuit light the LED compared to the circuits at your home?
- In a series circuit with multiple LEDs, what happens to the brightness of the LEDs that are further from the battery? Why?

To Know and Do More

When a light switch is off, the electrical pathway to a bulb is not complete and electricity cannot flow to light that bulb. When you flip the switch on, you close the circuit and the light turns on. If light is not needed, it is important not to waste the natural resources used to generate the electrical power that is being transformed to light. Have students create characters without noses to put over light switches at school or home. The art should help remind them to turn lights off!



WATTSMART BEGIN AT HOME

Activity: Where Do Fossil Fuels Come From?

Objective
Students will investigate and model the production of natural gas and oil from ancient life.

Curriculum Focus
Health and Wellness
Science
Social Studies

Materials (per student group)
- Container to represent the ocean, preferably clear
- Sand or dirt
- Baking soda "plankton"
- Vinegar (20%) and water (80%) "ocean" mixture
- Cup or scoop
- Safety goggles

Key Vocabulary
Physical properties
Odorant
Mercaptan
Combustible

Next Generation Science Correlations
4-ESS3 – 1
MS-ESS3.A

Introduction

Natural gas is a combustible, gaseous mixture of simple hydrocarbon compounds, usually found in deep underground reservoirs in porous rock. The prevailing scientific theory is that natural gas was formed millions of years ago when tiny sea plants and animals were buried by sand and rock. Layers of mud, sand, rock, plant and animal matter continued to build up until the pressure and heat from the overlying sediment turned them into a tar like substance called kerogen. As temperatures continued to increase and the kerogen continued to heat, more complex compounds of carbon and hydrogen we know as oil were formed. Natural gas is generated at the same time as oil and as it forms, the natural gas molecules migrate from the shale source rock into more porous areas such as sandstone. Natural gas continues to move to either the surface, where it escapes into the atmosphere, or it is trapped when its path is blocked by nonporous rock. In the latter case, the impermeable rock layers cause natural gas accumulation to occur.

NOTE: Do this activity as a demonstration or in small groups.

Procedure

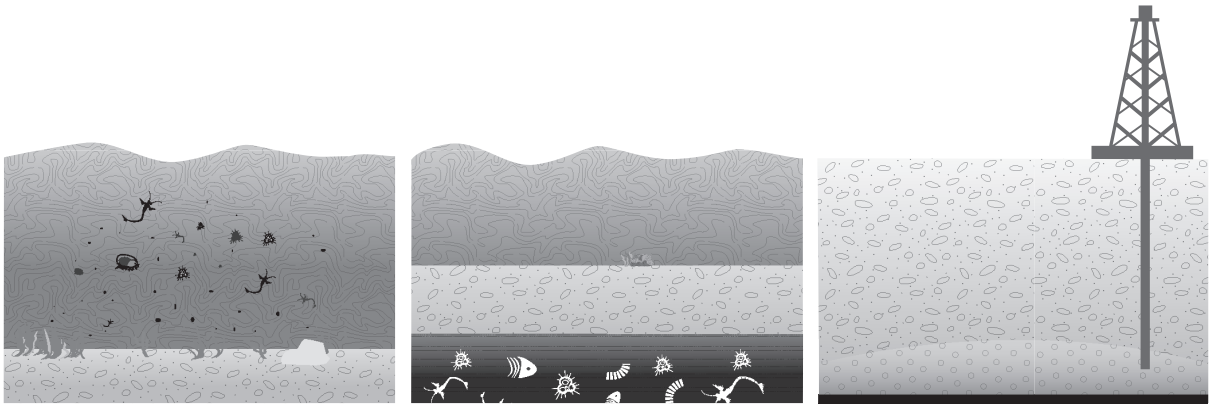
1. Explain to students that you will be showing them a model of how oil and natural gas form in the ocean. A very similar process takes place on land with plants to form coal.
2. Have students use safety goggles to avoid splashing vinegar water in their eyes. It is harmless, but uncomfortable.
3. Have students sprinkle a small amount of sand to cover the bottom of the container. The ocean floor is covered with sediments and the sand represents these sediments.
4. Next, have students sprinkle baking soda over the sand, liberally covering the bottom of the container. This represents plankton (microscopic plant life and animal like creatures called protists) that have died and settled down to the bottom of the ocean.
5. Explain that over time, sediments build up on the ocean floor. Students should completely cover the "plankton" with sand. (You can gently push the sand down with your hands to simulate the pressure and weight of the overlying sediments on the plankton.)
6. The ocean has water in it, so pour some of the vinegar/water "ocean" mixture into the container. Bubbles and foam begin to appear. You can see the bubbles bursting and can hear the gas being released to the air. Point out that this is a sign of a chemical change.

Discussion

- Discuss with students that natural gas in the ocean is produced much like in your demonstration, but that the process takes **many** years. In the ocean, plankton is buried under miles of sediment. The weight of this sediment causes high temperature and pressure which cooks the plankton deep underneath the ocean floor. The heat and pressure changes the plankton into oil and natural gas. Natural gas floats on top of the oil produced.
- Discuss how this model is different from real life. The gas produced in the experiment is carbon dioxide rather than natural gas, and since our container is open, the gas escapes into the air. In the ocean, there are usually impermeable layers that keep natural gas and oil trapped beneath the surface until we drill down and release it.

To Know and Do More

Go to **eia.gov** and research where we can find natural gas deposits. Are there natural gas deposits in your state? Find the natural gas pipelines that are located across the United States.



Activity: Layered Lunch

Objective

Students will understand that natural gas deposits are trapped and held by certain types of geologic formations.

Curriculum Focus

Science
Art

Materials

- Slices of bread
- Almond butter or other thick spread (e.g. cream cheese)
- Honey
- Plastic wrap or wax paper
- Plastic knife

Key Vocabulary

Permeable
Impermeable
Source rock

Next Generation Science Correlations

4-ETS1 - 1
4-ETS1.A
5-ETS1 - 1
5-ETS1.A
MS-LS4 - 1
MS-LS4.A
MS-ESS1 - 4
MS-ESS1.C
MS-ETS1 - 4
MS-ETS1.B

Introduction

How do we find natural gas? Try this activity to get an idea of the type of rock formations and characteristics geologists look for when locating natural gas deposits.

As natural gas molecules form, they migrate from shale source rock into more porous areas such as sandstone. Porous or permeable layers are much like a sponge with little pockets throughout the rock. The natural gas continues to move to either the earth's surface (where it escapes into the atmosphere) or it is trapped when nonporous or impermeable rock layers block its path.

Procedure

Using bread, almond butter and honey, create some edible models of rock layers. (In place of almond butter you could use peanut butter, Nutella or even thick frosting depending on allergies within the classroom.)

1. Spread thick layers of almond butter then honey on a slice of bread. Top it with another slice of bread.
2. Make a second sandwich just like the first or gently cut the sandwich in half.
3. Put one sandwich (or one half) with the almond butter layer above the honey and the other sandwich (or other half) with the honey on top of the almond butter.
4. Next spread a thick layer of only honey on a slice of bread, adding another slice on top.
5. Cover your sandwiches with wax paper or plastic wrap and gently press down on them for about three seconds, representing millions of years of pressure.
6. Cut the sandwiches in half and observe what has happened.

Discussion

1. What do you think the honey represents?

2. Which layer do you think represents porous rock?

3. Which layer is the nonporous rock?

4. Did the honey seep into both slices of bread? Why or why not?

5. What do you predict would happen with a sandwich made with only almond butter?

6. How might the ingredients you used affect your results?

7. Draw the layers of your sandwich and use colored pencils or crayons to distinguish the different layers and write labels for each layer that includes: impermeable, permeable, natural gas, nonporous rock and porous rock.

Answers

The honey represented natural gas or a fossil fuel. The bread was the porous rock where the honey or natural gas gets into the little pockets or air spaces. Almond butter acted like a nonporous rock layer blocking the honey from seeping into the slice of bread above the almond butter. The results may be different depending on your ingredients: denser bread allows less seepage, creamier almond butter may be less impermeable or thicker honey may not fill the little pockets as easily.

To Know and Do More

Assign students to further investigate how natural gas is trapped in rock formations. Have them draw pictures of a formation and the trapping of oil and natural gas in the earth.

Visit a natural history museum and look for prehistoric life forms and rock formations.

WATTSMART BEGIN AT HOME

Activity: How Do You Rate?

Objective
Students will conduct a home survey to determine how they can use energy more efficiently by changing their habits and improving conditions and thereby improve the environment in which they live.

Curriculum Focus
Language Arts
Science
Social Studies

Materials
- "Student Sheet: How Do You Rate?"

Key Vocabulary
Conservation
Efficiency
Environment
Natural resources
Quality of life

Next Generation Science Correlations
4-ESS3 – 1
5-ESS3 – 1
5-ESS3.C
MS-LS2 – 1
MS-ESS3 – 3
MS-ESS3.A

Introduction

We use natural resources every day. Sometimes we use them just as they come from earth or the atmosphere. At other times we alter their makeup to fit our needs. For instance, we use the sun just as it is to dry clothes, but we use photovoltaic cells to capture the sun's energy and convert it to electricity, a secondary energy source. We use coal just as it comes to us from the earth to make electricity, or we use coal to provide coke for steel manufacturing. Many natural resources we use every day are nonrenewable, once we use them they are gone. Others are renewable, they can be replaced through natural and/or human processes.

It is responsible to use all resources efficiently and wisely. When we do, we reduce energy use, save money and preserve the environment. Making wise decisions today will have a positive impact on our future.

Imagine the difference we could make if we all used energy more efficiently. We would conserve natural resources for the future and enjoy better air quality and a better life. Each one of us can truly make a difference. All it takes is knowledge and action.

Procedure

Using energy efficiently and conserving our natural resources are responsible and easy actions that students can take today to show they respect the environment and have a desire to protect and preserve it.

1. Pass out "Student Sheet: How Do You Rate." Discuss the actions that may apply to the school (e.g., windows and doors have weather-stripping; drapes or blinds are open on cold, sunny days and closed on hot days; thermostats are adjusted at night; lawns are only watered early or late in the day). As you discuss each action, write a T for true or F for false on the board to see how the school rates. What can the students do to improve energy use at school?
2. Decide on several actions the students can take at school to help save energy and protect the environment. One action might be to use both sides of their paper and then recycle. If a room is empty during lunch or at other times, they can be sure lights are turned off and computers are on sleep mode.
3. Have the students take the survey home and complete it with a parent or guardian Explain to students that it is important to record their true energy use and not mark what they think they should be doing.

4. How did the students' homes rate? Discuss the results of the home survey. Help students to become enthusiastic about conserving natural resources and using energy more efficiently.
5. Prepare a graph to show the results of the energy efficiency survey. Which efficiency tips are already practiced by most students? Which were least used? Graph the number of students marking true for each item.
6. Find the mean, median, mode and range of the data on the home survey.

Discussion

Discuss the benefits of energy conservation. How will our energy use impact our future? Compare the benefits and possible inconveniences and their correlation to our quality of life.

To Know and Do More

Why do you think people do not practice all of the energy efficiency tips on the survey? Are there false assumptions that affect people's behavior? (Believing that turning things on and off uses more energy than leaving them on, for example.)

Discuss how people in other geographic areas and cultures would rate. Does everyone have a car, dishwasher or an air conditioner?

Career Awareness Activity

Have the students think of some careers that could have a big impact on your community's energy usage. Some areas to consider: teachers impact energy usage through education and by example; utility workers impact energy through education and incentives; government regulators have an influence through restrictions and rewards, such as financial benefits or tax breaks.

WATTSMART® BEGIN AT HOME

Student Sheet: How Do You Rate?

How energy efficient is the building you live in? Together with your parents or guardians, answer the following questions to rate your home or apartment.

Circle T if the statement is true, F if the statement is false or NA if the statement does not apply to your living situation.

Heating and Cooling

Windows and doors have good weather-stripping.	T	F	NA	Ducts are insulated in unheated/uncooled areas.	T	F	NA
Window coverings are open on cold, sunny days and closed on hot days.	T	F	NA	Garage is insulated.	T	F	NA
Window coverings are closed at night when heat is on.	T	F	NA	Air filters on furnace and air conditioner are cleaned and changed regularly.	T	F	NA
Thermostat is set at 68 F (20 C) or lower in winter.	T	F	NA	Thermostat is adjusted at night.	T	F	NA
Air-conditioning is set at 78 F (26 C) or higher in summer.	T	F	NA	Fireplace damper is closed when fireplace is not in use.	T	F	NA

Water

A pitcher of water is kept in the refrigerator for drinking.	T	F	NA	Hot water heater is set at 120 F (49 C). • If someone in your household has a compromised immune system, consult your physician.	T	F	NA
Faucets and toilets do not leak.	T	F	NA	Hot water pipes from water heater are insulated.	T	F	NA
Showers and faucets are fitted with energy-efficient shower heads and aerators.	T	F	NA	If located in an unheated area, hot water heater is wrapped in an insulation blanket.	T	F	NA
Showers last no longer than 5 minutes.	T	F	NA	Broom, not hose, is used to clean driveways and sidewalks.	T	F	NA
Toilets are low flow, or tanks use water displacement devices.	T	F	NA	Faucet is shut off while brushing teeth and shaving.	T	F	NA

Appliances

Dishwasher is usually run with a full load.	T	F	NA	Clothes dryer is usually run with a full load.	T	F	NA
Automatic air-dry is used with the dishwasher.	T	F	NA	Clothes are often hung up to dry.	T	F	NA
Washing machine is usually run with a full load.	T	F	NA	Refrigerator is set no lower than 37 F (3 C).	T	F	NA
Cold water is used in washing machine most of the time and is always used for rinses.	T	F	NA	Lids are usually put on pots when boiling water.	T	F	NA
				Oven is preheated for only 10 minutes (if at all).	T	F	NA

Lighting

Lights are turned off when not in use.	T	F	NA	Light bulbs are kept dusted and clean.	T	F	NA
LED bulbs are used in at least one room.	T	F	NA	Sunlight is used whenever possible.	T	F	NA
Security and decorative lighting is powered by solar energy.	T	F	NA				

Trash

Glass, cans and newspapers are recycled.	T F NA	Overpackaged products are usually avoided.	T F NA
Plastic is separated and recycled.	T F NA	Reusable bags are used for groceries, or bags are recycled.	T F NA
Old clothes are often given to charities, secondhand clothing stores, etc.	T F NA	Rechargeable batteries are used when possible.	T F NA
Food scraps and organic waste are composted.	T F NA	Food is often bought in bulk.	T F NA
		Products made of recycled materials are favored.	T F NA

Transportation

Car is properly tuned and tires properly inflated.	T F NA	Public transportation is used when possible.	T F NA
Family drivers obey speed limit on the highway.	T F NA	Family members often walk or ride a bike for short trips.	T F NA
Family drives an electric vehicle.	T F NA	Kids and parents carpool when possible.	T F NA

Yard and Workshop

Lawns are watered early or late in the day.	T F NA	Cutting edges on tools are kept sharp.	T F NA
Grass is mowed to a height of 2 to 3 inches	T F NA	Electrical tools are maintained and gas equipment is kept tuned and serviced.	T F NA
Hand tools like pruners and clippers (rather than power tools) are used whenever possible.	T F NA		

Score 1 point for true, 0 points for false and 0 points for not applicable (NA).

Total Points: _____

Discuss the results of this survey with your family.
What can you and your family do to raise your score?

Activity: Energy in Math

Objective

Students will interpret and evaluate numerical expressions as they solve word problems.

Materials

- Copies of the questions found in the "To Know and Do More" section
- Individual white boards (optional)

Key Vocabulary

Watt

Common Core Correlations

Numbers and Operations

Data Analysis and Probability

Connection to the Real World

Measurement

Introduction:

In this activity, students will complete the problem set found on the next page within an allotted time (10 minutes). Students will solve the mathematical problems making connections to real world situations.

Procedure:

1. Instruct students on the importance of learning to solve real world problems using their math skills. You may want to review some steps to solving word problems before beginning the first problem. The following questions might be useful to review:
   - Can you draw something to help you?
   - What can you draw?
   - What conclusions can you make from your drawing?
2. Copy the questions on the "To Know and Do More" section on the next page and pass it out to students. Make sure to remove answers on the bottom of the page.
3. Model the problem.

   Have a pair of students work at the board while the others work independently or in pairs at their seats.

   As students work, circulate. Reiterate the questions above. After several minutes, have the demonstrating students receive and respond to feedback and questions from their peers if necessary.
4. Calculate to solve and write a statement.

   Give everyone 2 minutes to finish work on that question, sharing their work and thinking with a peer. All should write their equations and statements of the answer.
5. Assess the solution for reasonableness.

   Give students 1 to 2 minutes to assess and explain the reasonableness of their solution.

Discussion/Debrief

The student debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the problem set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed. Then guide students in a conversation to debrief the problem set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What did you notice about this word problem?
- What is different in the problem?
- What are we trying to find out?
- How can we represent this part of the story? (draw, write a number, use manipulatives)
- What would help us organize our thinking and our work? (answers may vary: draw it out, act it out, write an equation, etc.)
- What strategies can we use to solve this problem?

To Know and Do More

Have your students turn in their worksheets showing their work to solve each problem. This will help you to assess your students' understanding of the math concepts presented in the lesson.

1. Jessie saved more energy than Michael. Michael saved more energy than Maggie. Maggie saved less energy than Jessie. Karen saved more energy than Jessie. List the kids' names in order of how much energy they saved, least to most:
   - Jessie, Karen, Maggie, Michael
   - Maggie, Michael, Jessie, Karen
   - Michael, Jessie, Maggie, Karen
   - Maggie, Karen, Michael, Jessie
2. The Maher family used 57,000 gallons of water a year, costing them $525 to heat it. Estimate how much money they would save in a year if they cut their hot water use by 30,820 gallons.
   - $100
   - $240
   - $284
   - $525
3. If each person in a house uses a 60 Watt bulb in their own bedroom 4 hours a day, and there are three people living there, how many Watts will be used a day to light the bedrooms?
   - 20 Watts
   - 240 Watts
   - 650 Watts
   - 720 Watts
4. For every 10 degrees the water heater setting is turned down, you can save 6% of the energy used. If Charles turns his water heater down by 15 degrees, about what percent savings in energy will he save?
   - 6%
   - 9%
   - 12%
   - 15%

Answers: 1. Maggie, Michael, Jessie, Karen; 2. $284; 3. 720 Watts; 4. 9%

WATTSMART BEGIN AT HOME

Activity: Go Against the Flow

Objective
Students will be able to calculate flow rates of water, gallons of water and energy saved by replacing old fixtures with more efficient ones.

Curriculum Focus
Math
Science

Materials
- Flow test bag
- Stopwatch or clock with a second hand

Key Vocabulary
Aerator
Flow rate

Next Generation Science Correlations
4-ETS1 – 1-2
MS-ETS1 – 1

Introduction

This activity highlights the amount of water that must be heated to do everyday tasks such as washing dishes or taking a shower. Students will measure water output from a typical shower head and faucet aerator, then calculate the amount of water and energy used. This activity will need to be done over 2 days, allowing for time to test at home.

Procedure

1. Discuss the fact that heating water is one of the largest energy uses in the home and that most people have no idea how much water they use each day. Excessive water use and improper settings on water heater thermostats waste energy in many homes. Remind students that experts recommend setting the water heater temperature at 120 F. Brainstorm ways to use less hot water (for example, taking showers rather than baths, taking 5 minute showers and washing laundry in cold water).
2. Review how to use the flow test bag.
3. Have students test the flow rate of their shower heads and faucets at home and record their answers.
4. The next day, discuss how much heated water and energy was used in student homes for showers and faucets. Why do the numbers vary? Variables include the number of people in the home, the water pressure and the efficiency of faucet aerators and shower heads.
5. Discuss ways to reduce the water and energy used in our homes. What actions can we take to be more efficient in our water use?

To Know and Do More

Have students use a timer to try taking showers in 5 minutes or less, with the stipulation that they must actually get clean!


National
Energy
Foundation®
cultivating energy literacy

Lingo Card

L	I	N	G	O
Water	Natural Gas	Natural Resource	Incandescent	Reduce
Full Load	Phantom Load	Oil	Coal	ENERGY STAR®
Renewable	Energy	Be Wattsmart, Begin at home	Turn It Off	Uranium
Energy Efficiency	LED	Recycle	68 Degrees	Embodied Energy
Cooking	78 Degrees	Solar	Programmable or Smart Thermostat	Electricity

L	I	N	G	O
Full Load	Natural Gas	Phantom Load	LED	78 Degrees
Cooking	Electricity	Renewable	Recycle	68 Degrees
Natural Resource	Water	Be Wattsmart, Begin at home	ENERGY STAR®	Nonrenewable
Embodied Energy	Coal	Energy Efficiency	Heating	Incandescent
Programmable or Smart Thermostat	Reduce	Oil	Solar	Uranium

L	I	N	G	O
Coal	Natural Gas	Solar	Turn It Off	Renewable
Water	Nonrenewable	Phantom Load	Electricity	Full Load
Energy	Oil	Be Wattsmart, Begin at home	68 Degrees	Cooking
Programmable or Smart Thermostat	Incandescent	Recycle	Uranium	Natural Resource
Reduce	78 Degrees	Embodied Energy	LED	Energy Efficiency

L	I	N	G	O
Natural Resource	Water	Natural Gas	Programmable or Smart Thermostat	78 Degrees
Turn It Off	Reduce	Oil	Embodied Energy	Cooking
Phantom Load	ENERGY STAR®	Be Wattsmart, Begin at home	Uranium	Recycle
Energy	LED	68 Degrees	Energy Efficiency	Heating
Electricity	Renewable	Incandescent	Full Load	Solar

Dear Family,

Today your fourth grader participated in the **Be Wattsmart, Begin at home** program sponsored by Pacific Power. In this engaging presentation, your student learned key science curriculum concepts as well as important ways to be more efficient with energy use at home.

As part of the **Be Wattsmart, Begin at home** program, your fourth grader received a:

- **Be Wattsmart, Begin at home** booklet
- *Home Energy Worksheet* (HEW)

Please take a moment to read through this informative booklet with your family. Then fill out the HEW in one of two ways:

- Visit **thinkenergy.org/Wattsmart** and fill out an online worksheet. You will need to enter the teacher ID found on the paper worksheet. If you do not have the teacher ID, you can find it by searching for your teacher's name on the website.

  or

- Fill out the paper worksheet and return it to your student's teacher. To thank you, Pacific Power will provide your fourth grader with a Wattsmart nightlight.

We appreciate your efforts to reinforce important **Be Wattsmart, Begin at home** energy knowledge and efficiency actions in your home!

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Estimada familia,

Hoy su estudiante de cuarto grado participó en el programa **Sea Wattsmart, Empieza en casa**, patrocinado por Pacific Power. En esta presentación atractiva, su estudiante aprendió conceptos claves de su plan de estudios de ciencias, así como formas importantes para ser más eficiente con el uso de energía en el hogar.

Como parte del programa de **Sea Wattsmart, Empieza en casa**, su estudiante de cuarto grado recibió:

- El folleto de **Sea Wattsmart, Empieza en casa**
- *Verificación de Energía Doméstica*

Tome un momento para leer el folleto informativo con su familia. Luego complete la *Verificación de Energía Doméstica* de una de estas maneras:

- Visite **thinkenergy.org/Wattsmart** para rellenar el formulario en línea. Necesitará entrar el número de identificación de su profesor que se encuentra en el formulario de papel. Si no tiene el numero de identificación del profesor, se puede encontrarlo buscando el nombre de su profesor en el sitio web.

  o

- Complete el formulario y devuélvalo al profesor de su estudiante. Para agradecerle, Pacific Power le proporcionará al estudiante de cuarto grado una luz nocturna de Wattsmart.

Apreciamos sus esfuerzos para reforzar la importancia del **Sea Wattsmart, Empieza en casa** de la energía y los acciones eficientes en el hogar.

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Teacher Name

Student First Name, Last Initial

Teacher ID

Submit online
at thinkenergy.org/wattsmart

Home Energy Worksheet

Heating

1. Install and use a programmable or smart thermostat.

   ☐ Currently Do ☐ Will Do ☐ Neither

2. Caulk windows and weather-strip outside doors.

   ☐ Have Done ☐ Will Do ☐ Neither

3. Inspect attic insulation and add insulation if needed.

   ☐ Have Done ☐ Will Do ☐ Neither

4. Keep furnace air filters clean/replaced regularly.

   ☐ Currently Do ☐ Will Do ☐ Neither

Cooling

5. Replace existing air-conditioning unit with a high-efficiency unit, heat pump or an evaporative cooling unit

   ☐ Have Done ☐ Will Do ☐ Neither

6. Close blinds when windows are exposed to the sun.

   ☐ Currently Do ☐ Will Do ☐ Neither

7. Use a fan instead of air-conditioning.

   ☐ Currently Do ☐ Will Do ☐ Neither

8. In the summer, set your thermostat to 78 F or higher.

   ☐ Currently Do ☐ Will Do ☐ Neither

Water heating

9. Set the water heater temperature to 120 F.

   ☐ Have Done ☐ Will Do ☐ Neither

10. Install a high-efficiency shower head.

    ☐ Have Done ☐ Will Do ☐ Neither

11. Take 5 minute showers.

    ☐ Currently Do ☐ Will Do ☐ Neither

12. Wash full loads in the dishwasher and clothes washer.

    ☐ Currently Do ☐ Will Do ☐ Neither

Lighting

13. Replace inefficient bulbs with LED bulbs.

    ☐ Have Done ☐ Will Do ☐ Neither

14. Turn lights off when not in use.

    ☐ Currently Do ☐ Will Do ☐ Neither

Refrigeration

15. Replace old, inefficient refrigerator with an ENERGY STAR® model.

    ☐ Have Done ☐ Will Do ☐ Neither

16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.

    ☐ Have Done ☐ Will Do ☐ Neither

17. Maintain refrigerator and freezer coils and check door seals twice yearly.

    ☐ Currently Do ☐ Will Do ☐ Neither

Electronics

18. Turn off computers, TVs and game consoles when not in use.

    ☐ Currently Do ☐ Will Do ☐ Neither

Cooking

19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.

    ☐ Currently Do ☐ Will Do ☐ Neither

Get paid for being Wattsmart

20. Visit Pacific Power at **Wattsmart.com** for more energy saving tips and rebates.

    ☐ Have Done ☐ Will Do ☐ Neither

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Home Energy Worksheet (Spanish)

Identificación del profesor

Primer nombre del estudiante

Nombre del profesor

Enviar en linea
a thinkenergy.org/wattsmart

Verificación de Energía Doméstica

Calefacción

1. Instalar y usar un termostato programable o termostato inteligente.

   ☐ Lo hago ☐ Lo haré ☐ Ninguno

2. Calafatear ventanas e instalar burletes en el exterior de las puertas.

   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

3. Inspeccionar el aislamiento del ático y agregar aislamiento si es necesario.

   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

4. Mantener los filtros limpios de aire de la calefacción y reemplazarlos regularmente.

   ☐ Lo hago ☐ Lo haré ☐ Ninguno

Enfriamiento

5. Reemplazar la unidad de aire acondicionado existente por una unidad de alta eficiencia, bomba de calor o un enfriador evaporativo.

   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

6. Cerrar las persianas cuando las ventanas están expuestas al sol.

   ☐ Lo hago ☐ Lo haré ☐ Ninguno

7. Usar un ventilador en lugar del aire acondicionado.

   ☐ Lo hago ☐ Lo haré ☐ Ninguno

8. En el verano, ajustar el termostato a 78 F o más.

   ☐ Lo hago ☐ Lo haré ☐ Ninguno

Calentadores de agua

9. Programar el calentador de agua a 120 F.

   ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

10. Instalar un cabezal de ducha de alta eficiencia.

    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

11. Tomar duchas de 5 minutos.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

12. Lavar cargas llenas en los lavaplatos y las lavadoras de ropa.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Iluminación

13. Reemplazar las bombillas ineficientes con las bombillas ED.

    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

14. Apagar las luces cuando no estén en uso.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Refrigerador

15. Reemplazar el refrigerador viejo e ineficiente con un modelo de ENERGY STAR®.

    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

16. Desenchufar refrigeradores/congeladores viejos y/o desecharlos de una manera ambientalmente segura.

    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

17. Mantener las bobinas del refrigerador y del congelador e inspeccionar el sello de las puertas dos veces al año.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Electrónicos

18. Apagar computadoras, televisores y consolas de juegos cuando no estén en uso.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Cocinar

19. Usar un horno microonda, un horno eléctrico, una olla de cocimiento lento o una parrilla al aire libre en lugar del horno convencional.

    ☐ Lo hago ☐ Lo haré ☐ Ninguno

Reciba paga siendo Wattsmart

20. Visite Pacific Power en **Wattsmart.com** para obtener más consejos y rebajas de ahorro de energía.

    ☐ Lo he hecho ☐ Lo haré ☐ Ninguno

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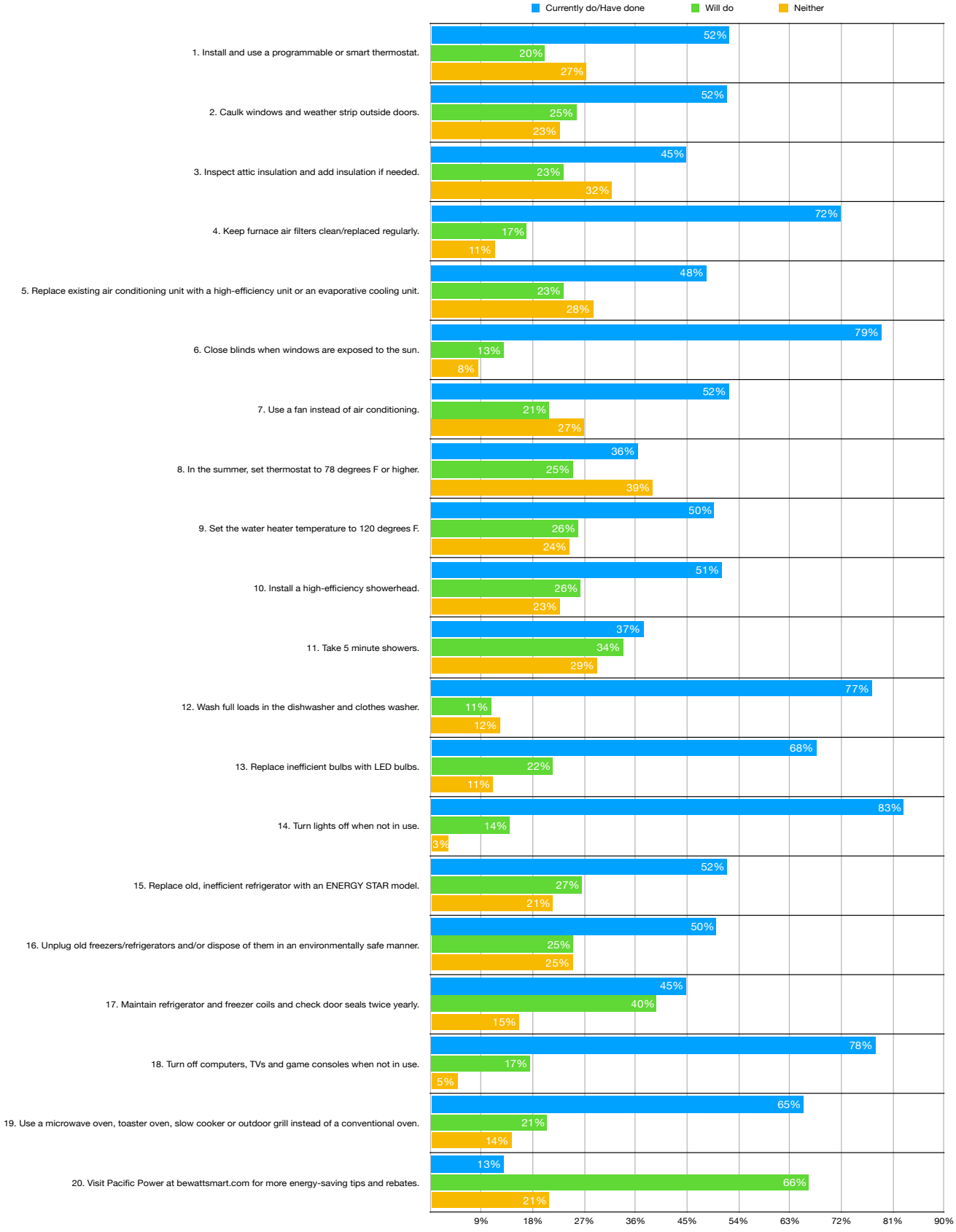
Home Energy Worksheet Summary – Pacific Power

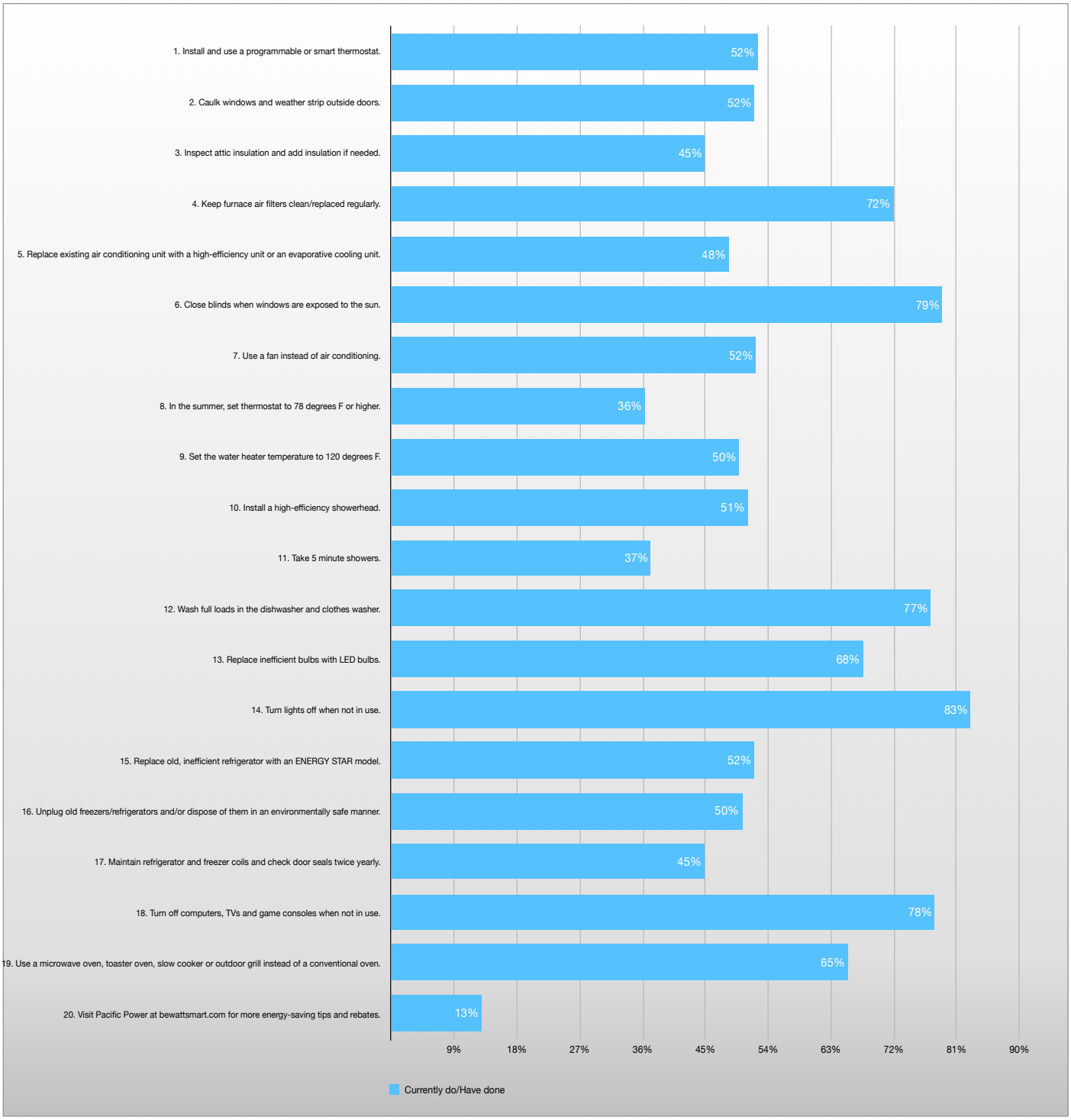
Energy Efficient Activity	Currently do/Have done	Will do	Neither
1. Install and use a programmable or smart thermostat.	52%	20%	27%
2. Caulk windows and weather strip outside doors.	52%	25%	23%
3. Inspect attic insulation and add insulation if needed.	45%	23%	32%
4. Keep furnace air filters clean/replaced regularly.	72%	17%	11%
5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.	48%	23%	28%
6. Close blinds when windows are exposed to the sun.	79%	13%	8%
7. Use a fan instead of air conditioning.	52%	21%	27%
8. In the summer, set thermostat to 78 degrees F or higher.	36%	25%	39%
9. Set the water heater temperature to 120 degrees F.	50%	26%	24%
10. Install a high-efficiency showerhead.	51%	26%	23%
11. Take 5 minute showers.	37%	34%	29%
12. Wash full loads in the dishwasher and clothes washer.	77%	11%	12%
13. Replace inefficient bulbs with LED bulbs.	68%	22%	11%
14. Turn lights off when not in use.	83%	14%	3%
15. Replace old, inefficient refrigerator with an ENERGY STAR model.	52%	27%	21%
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.	50%	25%	25%
17. Maintain refrigerator and freezer coils and check door seals twice yearly.	45%	40%	15%
18. Turn off computers, TVs and game consoles when not in use.	78%	17%	5%
19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.	65%	21%	14%
20. Visit Pacific Power at bewattsmart.com for more energy-saving tips and rebates.	13%	66%	21%



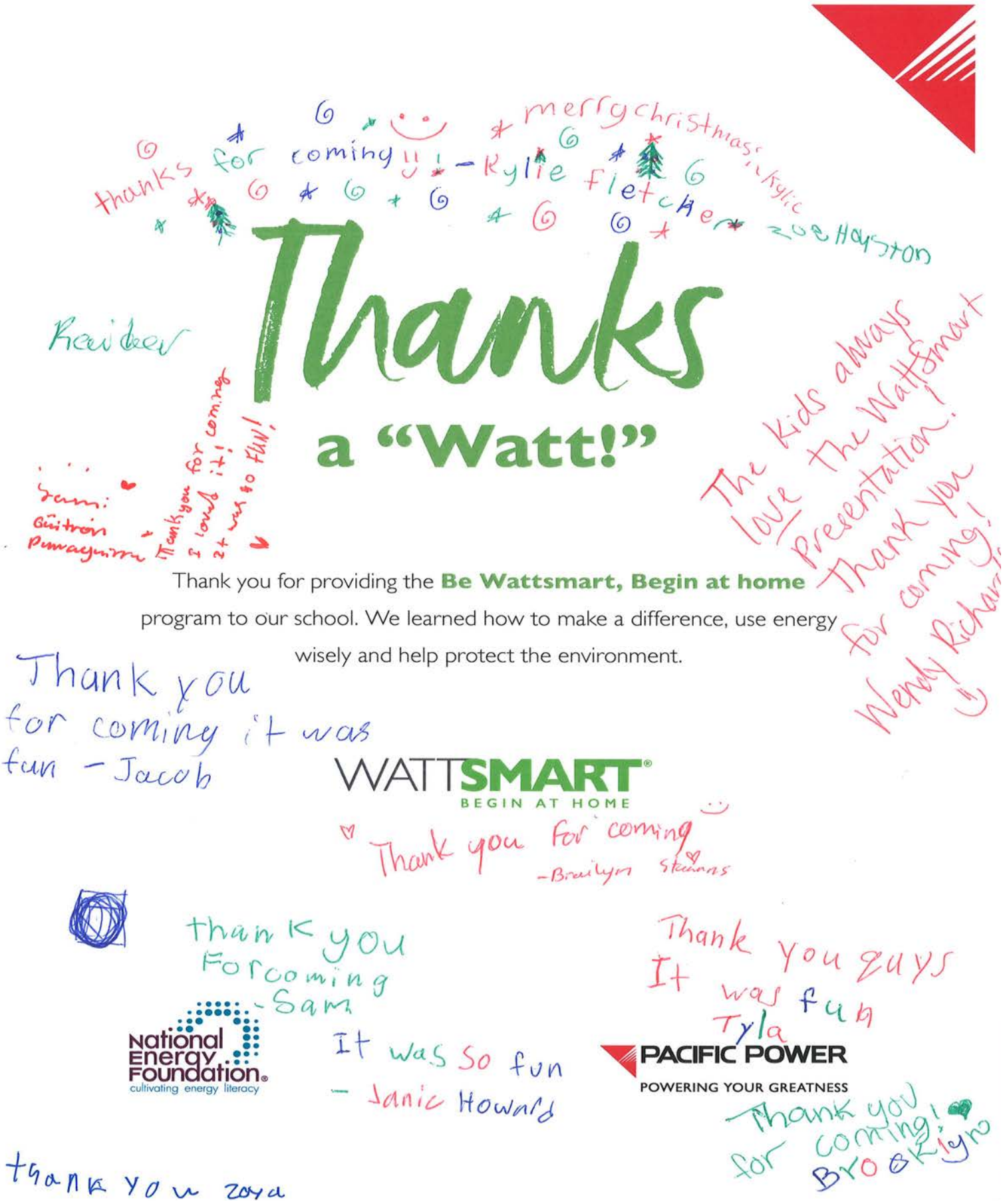
Data Numbers

Energy Efficient Activity	Currently do/Have done	Will do	Neither	Total Responses
1. Install and use a programmable or smart thermostat.	716	276	374	1366
2. Caulk windows and weather strip outside doors.	707	347	307	1361
3. Inspect attic insulation and add insulation if needed.	610	316	432	1358
4. Keep furnace air filters clean/replaced regularly.	978	231	152	1361
5. Replace existing air conditioning unit with a high-efficiency unit or an evaporative cooling unit.	653	315	384	1352
6. Close blinds when windows are exposed to the sun.	1072	174	112	1358
7. Use a fan instead of air conditioning.	710	283	367	1360
8. In the summer, set thermostat to 78 degrees F or higher.	493	338	529	1360
9. Set the water heater temperature to 120 degrees F.	678	352	331	1361
10. Install a high-efficiency showerhead.	696	359	309	1364
11. Take 5 minute showers.	507	459	397	1363
12. Wash full loads in the dishwasher and clothes washer.	1051	144	165	1360
13. Replace inefficient bulbs with LED bulbs.	918	293	149	1360
14. Turn lights off when not in use.	1127	189	42	1358
15. Replace old, inefficient refrigerator with an ENERGY STAR model.	708	362	293	1363
16. Unplug old freezers/refrigerators and/or dispose of them in an environmentally safe manner.	679	339	336	1354
17. Maintain refrigerator and freezer coils and check door seals twice yearly.	604	536	209	1349
18. Turn off computers, TVs and game consoles when not in use.	1062	238	64	1364
19. Use a microwave oven, toaster oven, slow cooker or outdoor grill instead of a conventional oven.	884	278	191	1353
20. Visit Pacific Power at bewattsmart.com for more energy-saving tips and rebates.	174	901	283	1358

Wise Energy Behaviors in Pacific Power Washington Homes



Sampling of *Thanks a "WATT" Cards*



Ezra

Noel

Mia

Linus

Alex

Dustin

Aris

Alison

Emily

Thanks a "Watt!"

Alexis

Thank you for providing the **Be Wattsmart, Begin at home** program to our school. We learned how to make a difference, use energy wisely and help protect the environment.

Jesus

Luna

Cesar

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Nelly

Aiden

Mendoza

Michelle

Stephanie

Valentina

Chavez

Gonzalez

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Thank you so very much! The kids loved it and learned a lot!
Deb Ogura

Thanks a "Watt!"

Kimberly Alycia

Thank you for providing the **Be Wattsmart, Begin at home** program to our school. We learned how to make a difference, use energy wisely and help protect the environment.

Aaron Maylen Stephanie Santiago

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Emilio Dab

Aleyda Mrs. Cruz Abril

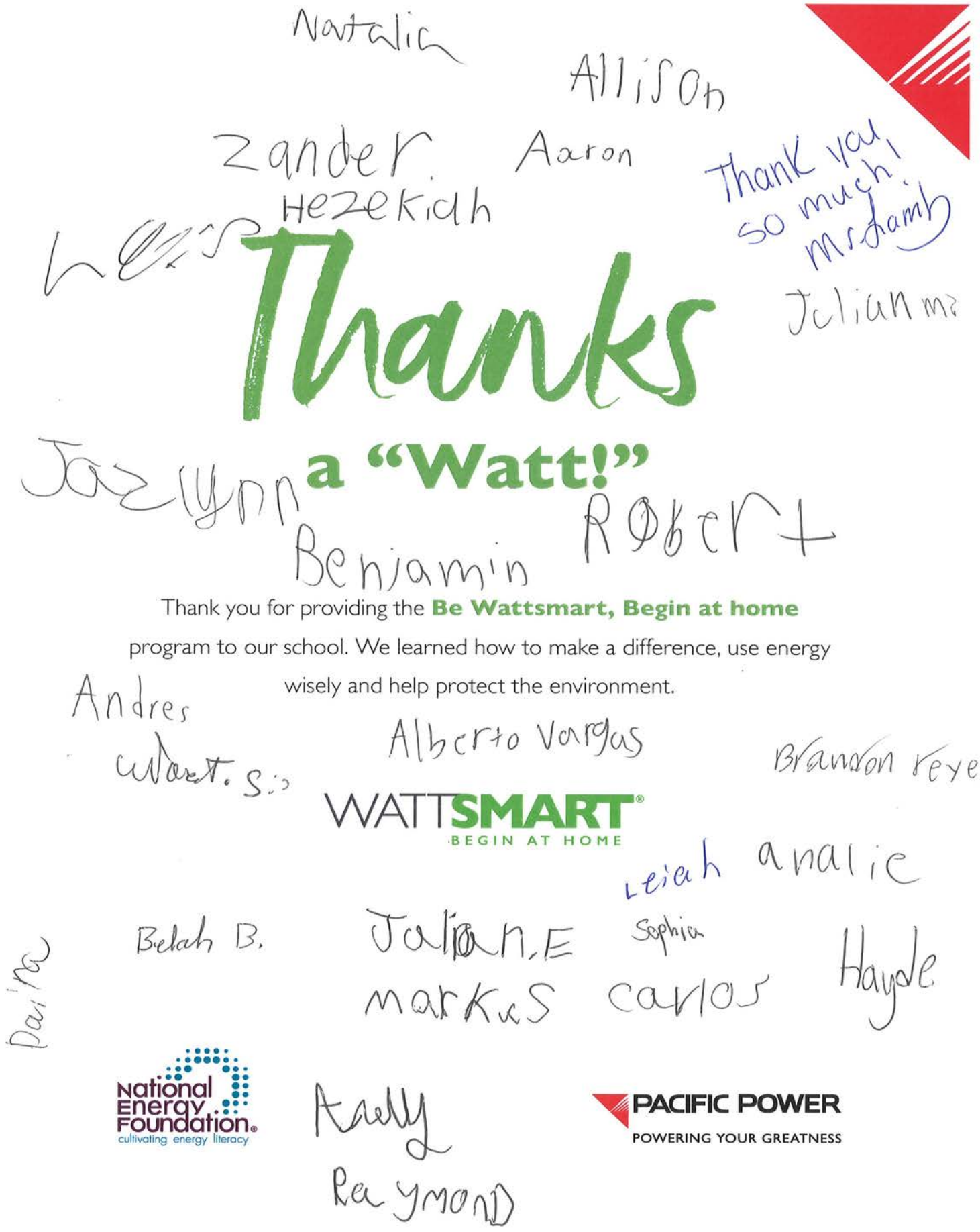
Ariel Robert Desmond

Valerie Zoe

Benny National Energy Foundation® cultivating energy literacy

Angel PACIFIC POWER POWERING YOUR GREATNESS

Uriel Ezra Leann



Mia Garcia

Isabell Cisneros

Mia Arabella Monkss

Maggie Pickle

Rylee

marcus calvin weible

Kelly Rodriguez

Thanks a "Watt!"

Mia Diaz Dominguez

Piper S

Kaleb Allston

Faith Ray

Jae'Vaun

Diego Hernandez Solís

Thank you for providing the **Be Wattsmart, Begin at home** program to our school. We learned how to make a difference, use energy wisely and help protect the environment.

Jaden Navarrete

ISAAC Escalera

Jaydun

Devin Heater

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Lilly Gutierrez

Lorenzo Salcedo

Mrs. April King

Eddie Pineda

Solarah

Reece

Adrian

Annabelle Peterman

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