

# VALUE YOUR POWER

## VIRGINIA ENERGY SENSE

Dear Virginia Educator,

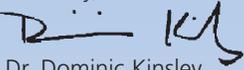
The how and why of saving energy at home are important lessons for your students, especially today, when new technologies, among other factors, are increasing our energy demands and challenging our energy resources.

Virginia Energy Sense is the Commonwealth's consumer electric energy education and outreach initiative. A program of the State Corporation Commission (SCC), Virginia Energy Sense provides informative energy conservation and efficiency tips and resources that all Virginians can apply at home, work, and school to help meet Virginia's goal to reduce electricity consumption by 10 percent. This statewide initiative encourages Virginians to **Value Your Power** by becoming smarter energy users and reducing their own energy use.

The curriculum specialists at Young Minds Inspired (YMI) are pleased to partner with Virginia Energy Sense to provide you with this cross-curricular, standards-based **Value Your Power** program. The math and science activities have been developed specifically for fourth-grade students in Virginia classrooms to teach how electrical energy is used in the home, how it can be conserved, and how conservation leads to cost savings.

Please share this valuable program with other teachers in your school. Although the materials are copyrighted, you can reproduce them for educational purposes. Please return the enclosed reply card to let us know your opinion of the program or give us your feedback online at [www.ymiclassroom.com/VES.html](http://www.ymiclassroom.com/VES.html).

Sincerely,



Dr. Dominic Kinsley  
Editor in Chief

### TARGET AUDIENCE

**Value Your Power** is designed for use with fourth-grade students in Virginia classrooms as a supplement to science and math curricula.

### STANDARDS ALIGNMENT

This program aligns with Virginia Education Standards in science and math for Grade 4. For details, please visit [www.ymiclassroom.com/VES.html](http://www.ymiclassroom.com/VES.html).

### PROGRAM OBJECTIVES

- Help students understand how they use energy and how they can save energy easily and cost effectively.
- Help students understand how to read their electric bill and use the information to reduce consumption.
- Encourage students to take an active role in reducing electric energy consumption.

### PROGRAM COMPONENTS

- Teaching suggestions and background information.
- Three reproducible activity sheets.
- A wall poster for display in your classroom.
- A reply card for your important comments, or comment online at [www.ymiclassroom.com/VES.html](http://www.ymiclassroom.com/VES.html).

### USING THE PROGRAM COMPONENTS

- Photocopy this teacher's guide and make copies of the activity sheets for each student. Please share them with other teachers in your school.
- Use the poster to introduce the materials to your students and keep it on display as a long-term reminder of the importance of energy conservation.

### ACTIVITY 1

#### IT ALL ADDS UP

**Part A.** Discuss the sections on the sample electric bill and provide time for students to graph the monthly usage overview displayed. Point out that usage was highest during the coldest and hottest months. Explain that heating and cooling are the largest users of energy in a home; they account for an average of 25% of the annual electric bill. Mention that if people make an active effort to turn off lights, electronics and appliances and turn down the thermostat when they leave their home, they can reduce their energy use. For more detailed bill explanation information, refer to additional resources at [www.virginiaenergysense.org/school](http://www.virginiaenergysense.org/school).

Energy cost answer:  
 $1000 \text{ kWh} \times 10.7 \text{ cents/kWh} = \$107/\text{month}$ .

**Part B.** Ask students to refer to the information on the sheet as they and their parents review their family's electric bill. Students should then create a graph of their family's monthly usage during the past year and calculate how much their family has spent on energy this year. Encourage students to talk about what might affect their electricity usage.

### ACTIVITY 2

#### SAVING AT HOME

**Part A.** Introduce students to the math involved in figuring out how much energy appliances use.

**Part B.** Show students that math has real-life applications by helping them determine how much energy their family consumes from using typical household appliances.

**Part C.** Have students calculate how much energy your class could save if every family cut back on using each of the listed appliances by one hour each week. Then calculate how much your whole school could save. Conclude by dividing students into groups to brainstorm conservation methods.

### ACTIVITY 3

#### VALUE YOUR POWER FAMILY SCOREBOARD

**Part A.** This at-home activity asks students and their family to participate in a **Value Your Power** challenge for one week to see how many actions they take at home—things they already do and new things they can begin to do—to save energy. Explain that many devices, like TVs and appliances, are always ready to operate, so they act like vampires, sucking away energy even when they're "off," so unplugging is a good idea. But there are other simple things people can do, like turning down the thermostat or opening shades when it's a sunny winter day.

**Part B.** Have students fill in the challenge dates on the scoreboard and write the date they are to bring it back to school. Provide time for students to share their families' ideas.

### RESOURCES

Virginia Energy Sense – [www.virginiaenergysense.org](http://www.virginiaenergysense.org)  
Virginia Energy Sense for teachers and students – [www.virginiaenergysense.org/school](http://www.virginiaenergysense.org/school)  
Young Minds Inspired – [www.ymiclassroom.com](http://www.ymiclassroom.com) to download more free programs



is the only company developing free, innovative classroom materials that is owned and directed by award-winning former teachers. Visit our website at [www.ymiclassroom.com](http://www.ymiclassroom.com) to send feedback and to download more free programs. For questions, contact us at 1-800-859-8005 or email us at [feedback@ymiclassroom.com](mailto:feedback@ymiclassroom.com).

# ACTIVITY 1

# IT ALL ADDS UP

Do you know how much energy your family uses? Every month, your power company or electric cooperative sends your family a bill for the electric energy you have used. The bill shows how much the energy costs and how much energy you have used in recent months. To start saving energy, you need to take a close look at those numbers.

**Part A.** There are a number of utility providers and electric cooperatives in Virginia. Bills can vary slightly based on provider, but they all contain the same basic information. We're going to look at a sample bill to help you better understand your home bill and electricity use. For more detailed bill information, refer to additional resources at [www.virginiaenergysense.org/school](http://www.virginiaenergysense.org/school).

**Electricity Bill**

**Billing and Payment Summary**

Account # 78787847874 Due Date: Dec 14, 20XX  
 Total Amount Due: \$154.35  
 To avoid Late Payment Charge please pay by Dec 14, 20XX  
 Previous Amount Due: \$97.22

**Meter and Usage**

Current Billing Days: 30  
 Billable Usage: [Table with 12 months of usage data]

Bill Date Nov 19  
 Please Pay by 12/14 \$154.35

**Explanation of Bill Detail**

**Customer Service 1866-666 HELP**

Previous Balance \$97.22  
 Payment Received \$97.22 CR  
 Balance Forward \$0.00

**Residential Service**

Distribution Service \$31.98  
 Electricity Supply Svc (ESS) Generation \$50.93  
 Transmission \$12.87  
 Fuel \$52.86

Sales and Use Surcharge \$0.70  
 State/Local Consumption Tax \$2.01  
 Utility Tax \$3.00  
**Total Current Charges \$154.35**  
**Total Account Balance \$154.35**

Amount Enclosed [ ]

- *Distribution Service:* The charge for wires, transformers, and other equipment used to deliver electricity.
- *Electricity Supply Service:* The costs of generating the electricity (Generation) and moving it from the power plant to a local substation (Transmission). This also includes the cost for the fuel that was used to produce the electricity.
- *State, Local, and Utility Taxes:* Taxes based on the amount of energy used by customers and a tax imposed on energy services by local ordinance.

Let's take a look at the kWh of electricity this customer used each month during the last year. In the space below, make a bar graph using the monthly usage information on the bill.

1500													
1400													
1300													
1200													
1100													
1000													
900													
800													
700													
600													
500													
400													
300													
200													
100													
kWh	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	

The **Billing and Payment Summary** at the top shows the customer's account number, the date the payment is due, the amount due, and payments since the last bill.

The **Meter and Usage section** shows how much electricity the customer used during the current billing cycle and how much electricity they used each month during the past year. These amounts are shown in a unit of measurement called *kilowatt hours (kWh)*. Kilowatt hours are units used to measure your electric use over time. Using 1,000 watts of electricity for 1 hour means that you used 1 kWh (1000 watts per hour = 1 kWh). Your total bill is calculated by taking the number of kWh used and multiplying by cents per kWh.

The **Explanation of Bill Detail** shows how much the customer owed last month, how much was paid, and what is still owed. It also shows itemized power charges for:

- When was the monthly bill the highest? What might have contributed to that spike?
- If a Virginia family uses an average of 1000 kWh of energy per month, and the average cost is 10.7 cents/kWh, what is their average monthly bill?

**Part B.** Now, look at your family's monthly bill. On the back of this paper, graph your family's monthly energy usage for the past year. How much did your family spend on electric energy each month for the last 10 months?

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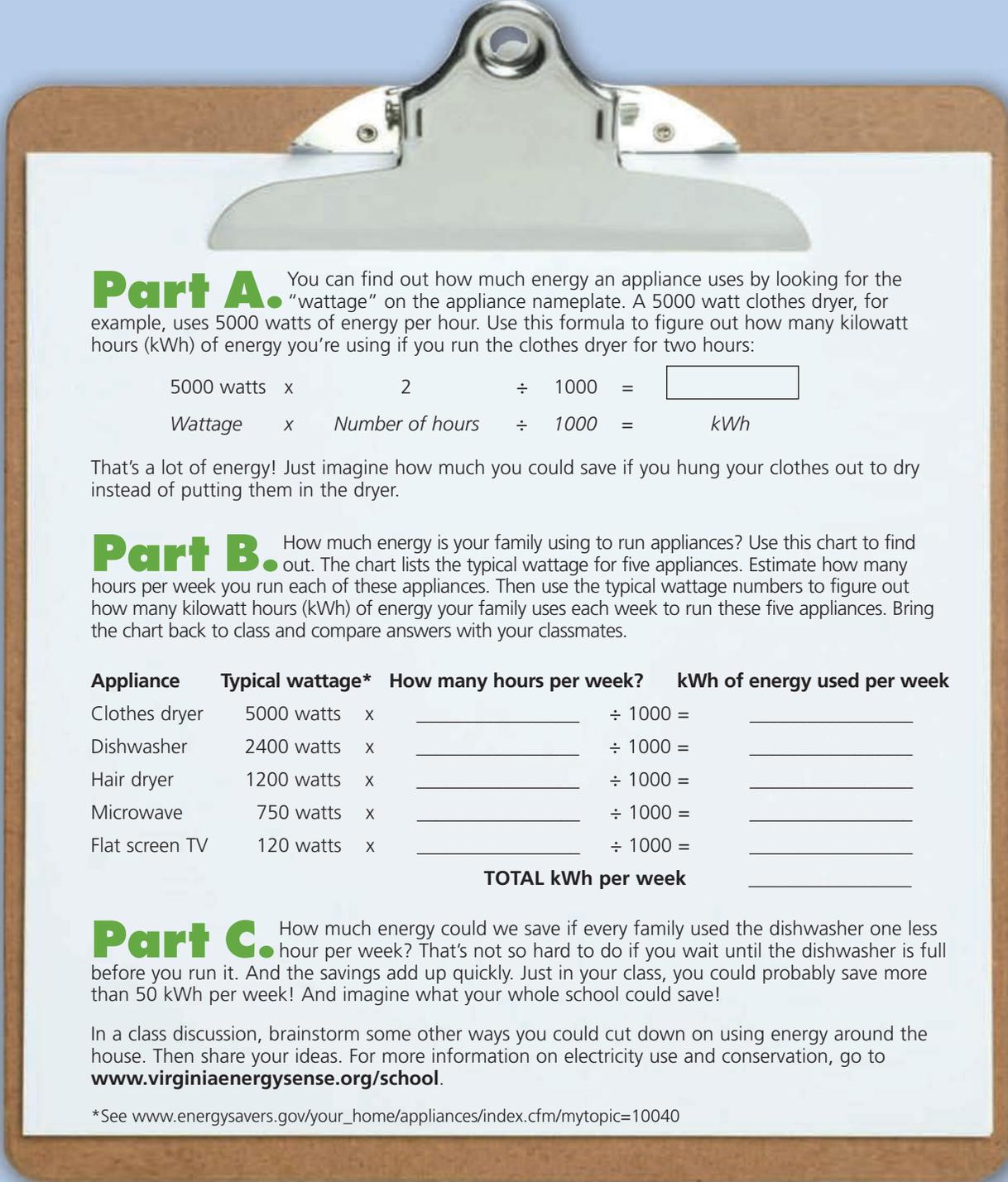
FIND OUT MORE ABOUT HOW YOU CAN SAVE ENERGY AT  
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# ACTIVITY 2

# SAVING AT HOME

In the first activity, we tracked energy usage for one year, and we talked about how factors such as weather affect energy usage. Now we're going to focus on saving energy, and we'll start by figuring out how much energy is used by some common household appliances.



**Part A.** You can find out how much energy an appliance uses by looking for the "wattage" on the appliance nameplate. A 5000 watt clothes dryer, for example, uses 5000 watts of energy per hour. Use this formula to figure out how many kilowatt hours (kWh) of energy you're using if you run the clothes dryer for two hours:

$$5000 \text{ watts} \times 2 \div 1000 = \boxed{\phantom{000}}$$

*Wattage*    *x*    *Number of hours*     $\div$     *1000*     $=$     *kWh*

That's a lot of energy! Just imagine how much you could save if you hung your clothes out to dry instead of putting them in the dryer.

**Part B.** How much energy is your family using to run appliances? Use this chart to find out. The chart lists the typical wattage for five appliances. Estimate how many hours per week you run each of these appliances. Then use the typical wattage numbers to figure out how many kilowatt hours (kWh) of energy your family uses each week to run these five appliances. Bring the chart back to class and compare answers with your classmates.

Appliance	Typical wattage*	How many hours per week?	kWh of energy used per week
Clothes dryer	5000 watts	$\times$ _____ $\div$ 1000 =	_____
Dishwasher	2400 watts	$\times$ _____ $\div$ 1000 =	_____
Hair dryer	1200 watts	$\times$ _____ $\div$ 1000 =	_____
Microwave	750 watts	$\times$ _____ $\div$ 1000 =	_____
Flat screen TV	120 watts	$\times$ _____ $\div$ 1000 =	_____
<b>TOTAL kWh per week</b>			_____

**Part C.** How much energy could we save if every family used the dishwasher one less hour per week? That's not so hard to do if you wait until the dishwasher is full before you run it. And the savings add up quickly. Just in your class, you could probably save more than 50 kWh per week! And imagine what your whole school could save!

In a class discussion, brainstorm some other ways you could cut down on using energy around the house. Then share your ideas. For more information on electricity use and conservation, go to [www.virginiaenergysense.org/school](http://www.virginiaenergysense.org/school).

\*See [www.energysavers.gov/your\\_home/appliances/index.cfm/mytopic=10040](http://www.energysavers.gov/your_home/appliances/index.cfm/mytopic=10040)

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# ACTIVITY 3

REPRODUCIBLE ACTIVITY

## VALUE YOUR POWER FAMILY SCOREBOARD

Now it's time to take the **Value Your Power** family challenge! For the next week, use this scoreboard to track how your family uses and conserves energy. Include things you already do and new things you can start to do. We've helped you get started. With your family members, find other things to add to the list. Hang this checklist on your fridge as a reminder for everyone in your home and place a check mark in the box each time you or a member of your family does one of these things each day.

### OUR FAMILY'S VALUE YOUR POWER SCOREBOARD

Date							
Turn off lights when leaving a room							
Unplug energy vampires							
Keep the thermostat one degree lower							
Run your washing machine with cold water only							

I will bring my scoreboard back to class on \_\_\_\_\_.

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# SAVING ENERGY MAKES SENSE AND SAVES CENTS!

Help  
save energy  
in this house.  
Write your energy-saving  
tips below.

Replace regular light bulbs with energy-efficient compact fluorescent lights (CFLs) or LEDs.

In the fall and winter, keep shades and curtains open on the sunny side of the house during the day. Close them at night to keep in the heat.

Don't keep the refrigerator door open for too long.

If you have storm windows, make sure they are down during the winter to keep out drafts.

Make sure the dishwasher is full before running it.

Instead of turning up the thermostat when you're cold, put on a sweater or an extra blanket at night.

Use the oven light to check food instead of opening the oven and letting energy out.

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