Bay Area Scientists in Schools Presentation Plan

Lesson Name Global Warming and Energy Efficiency
Presenter(s) Maria Schriver, Jon Mingle, Jessy Baker

Grade Level 3 **Standards Connection(s)** Planet Earth, systems, energy

Abstract: This class will teach kids where energy comes from and how global warming happens. We will have an energy conservation activity, and end with a brainstorm on how to conserve energy in our homes.

Vocabulary/Definitions:

Energy – we get this mostly from fossil fuels – can be electricity, light, heat, motion
Pollution – caused when we burn fossil fuels to make electricity
Carbon Dioxide – a common type of pollution that causes global warming
Global Warming – heating of the planet from too much carbon dioxide – very dangerous
Fossil Fuels – cause global warming – oil, gas, coal

Materials:

We'll bring materials for an energy efficiency activity, and a handout for students to take home with them
Students don't need to bring any supplies.

Classroom Set-up:

Halfway through the class, students will be placed in groups of 3-5
We will need one outlet for every 2-4 groups
We will plan to use the blackboard or whiteboard during the lesson
5 minutes will be needed for setup / cleanup

Classroom Visit

1. Personal Introduction: **5 Minutes**

Who are you? What do you want to share with students and why? How will you connect this with students' interests?

Topic Introduction: **15 Minutes**

Big Idea(s), vocabulary, assessing prior knowledge. What questions will you ask to learn from students?

Who's heard of global warming? What does it mean (the earth is getting hotter).
Global warming is kind of a form of pollution. When we burn stuff, a chemical called carbon dioxide is released. It lets light in, but doesn't let heat out, so it's kinda like the glass windows in

your car. What happens if you leave the windows up in a car when it's in the sun? (it gets hot). CO2 does the same thing to the whole earth-and the whole earth gets just a little bit warmer. So why do we care? What are bad things that might happen if the world gets warmer? (get them to seas rising and species dying-polar bears). GW is bad-today, we want to learn what we can do about it.

Additional Intro on Fossil Fuels

What is pollution? Ask and get a few responses from students.
Question: Why does global warming happen?

T: There are many reasons that the earth is getting warmer, but one of the most important is people's use of fossil fuels. What are some examples of fossil fuels?

Students: (offer examples of coal, oil, gas…)

T: Where do fossil fuels come from – why do we call them fossil fuels?

Students: (Because they used to be dinosaurs! Dead plants etc…)

T: That's right. Fossil fuels like coal and petroleum used to be living things millions of years ago. For example, coal, which we use to make over half of our electricity in the U.S., is a black rock made mostly of carbon. It was formed when plants died a long time ago in swamps, and were buried and preserved from the atmosphere, and then hardened under pressure. Has anyone ever seen a piece of coal?

Students: ? (pass around coal)

T: When we burn an ounce of coal, the energy in it can be used to power a (60 w) incandescent lightbulb for 1 hour. Just think of how many lumps of coal it takes to turn on all the lights across the country.

How do you think oil is made?

Students: (like coal? things die?)

T: Oil, or petroleum, results from a similar process, but while coal mostly comes from plants on the land, oil comes from very small organisms in the sea like algae. When the algae and other tiny sea creatures died hundreds of millions of years ago some of it would settle to the bottom of the sea, where there was little or no oxygen. Some would become buried under sediment, and heat and pressure would turn it into a liquid. A very small percentage of it has been trapped in layers of rock. Today big companies find these traps and drill into them to remove the oil. Then they refine it, changing it into fuels like gasoline and diesel and kerosene.

How do we use these fuels?

Students: (to drive cars, etc.)

T: That's right. People use fuels from petroleum to power cars and other machines. People in the U.S. use about 400 million gallons of gasoline in their cars and vehicles every day. That's 146 billion gallons every year! Compare that to milk – Americans consume about 7 billion gallons of milk a year. So we consume twenty times as much gasoline!

Because it takes so long for oil and coal to form, do you think that we will be able to keep using so much of these fuels?

Students: (No! They're not renewable…)

T: How many of you have piggy banks to keep money in?

So one way to think about fossil fuels is like your piggy bank. The energy in coal and oil came from living things a long time ago. When they died, they and the solar energy they stored were preserved in layers of the earth – the earth's piggy bank. So if you save a lot of money in your bank and then set it aside, but come back and find it years later, you feel like you're rich, right? Now we are using that very old energy in the earth's piggy bank for our transportation and electricity and to make things we need or want, instead of using the energy from the sun and the wind and water that we could use today. It's kind of like spending only part of the money that your parents give you for an allowance, instead of wasting it and spending all the money in your piggy bank all at once.

But why is this bad? How do you think our use of fossil fuels contributes to global warming?

Students: (Carbon dioxide?)

T: Good! What happens when you go camping and make a campfire?

Students: (We make s'mores; the fire creates smoke and the wood turns to ash)

T: So burning fossil fuels is kind of like burning wood. Smoke is produced, but there are other gases produced by the chemical reaction that we can't see but which are very important to global warming. One of them is carbon dioxide, which we now call a "greenhouse gas". Every time we burn fossil fuel to power a generator or power the engines in our cars, carbon dioxide is emitted to the atmosphere. All that carbon that was stored in the earth over millions of years is being released very quickly, in the form of carbon dioxide, which goes up to the atmosphere and traps energy from sunlight, just like the car that Maria talked about.

[Below only if there's time:]
T: All the energy stored in Earth's reserves of coal, oil, and natural gas is equal to the energy that reaches the planet in just 20 days of sunshine. Crazy, huh?

Can you think of some fuels that are renewable – that is, they come from a stock that we'll never run out of?

2. **Learning Experience(s):** **15 Minutes**
Demonstrations, hands-on activities, images, games, discussion, writing, measuring… What will you do, what will kids do? Describe in order, including instructions to kids.

1. Introduce lightbulb activity-I have two bulbs. What's the purpose of a lightbulb (to give light). Is one of these doing that much better than the other? (they're about the same). What difference can you feel between them (one is hotter). Which do you think is using more electricity? Electricity, light, and heat are all forms of energy, and moving around (yourself or your car) is another form. We can convert between them, so the electricity gets converted to light and heat. We need more electricity for the hotter (incandescent) bulb. Which bulb causes more global warming?

2. So, one way we waste a lot of energy (and cause a lot of global warming) is by using bad lightbulbs. Another way is when we heat our houses. How do we waste energy then? (leaving doors open, etc). So, if we found a way not to let the heat escape, would we need more or less energy (less), which means (less) global warming. This box is your house. There's a heater in the center and your goal as a group is to prevent the heat from escaping. You can buy ....(use board). There's not enough materials for every group to do the same thing, though. You can buy 1 material and it cannot go inside the house. So, if your group is the best at keeping the heat in, how will we know? (the house will get hottest) So we'll check back after about 15 minutes and see who's house is the hottest. So...what's your goal? How many materials can you buy? Does anything go inside the house?

Students choose materials and put them on/in houses

Give each group a thermometer and ask them to read the temperature of their house. Also ask a few students to feel the outside of the warmest and coolest house. Mention how heat escapes and what worked.

Do you want your house to be (hottest temp) NO! If we wanted each of these houses to be the SAME temperature, which would need the LEAST energy? which causes the least global warming? So there's another thing you can do today-try to think of ways to keep the heat inside your house when the heater's on. Jessy's going to give you a ton of other ideas of things you can do today to reduce global warming and save the polar bears and San Francisco!

3. **Wrap-up: Sharing Experiences and Building Connections** **10 Minutes**
Putting the pieces together – how will students share learning, interpret experience, build vocabulary?
(Bring students back to lesson objective)
We've learned that wasting energy causes global warming, and global warming is bad for us.

What are we using all this energy for?

Maybe if we know where's it's coming from, we can stop wasting it.

<draw fig 1 – 4 piece pie chart>

Half of the energy we use in America comes from factories and stores. Does anyone know how we could make factories and stores use less energy?

<buy less, buy used or recycled goods, buy green products, buy local goods, bring your own bag, less packaging, less meat>

One quarter of the energy America uses is for cars. Who knows how we could save energy in cars?

<drive less, more people in car, walk, bike, drive slower, smaller cars, hybrid cars>

The rest of the energy we use is from our houses. <draw fig 2>

Almost half of the energy our houses use is from heating and air conditioning! Let's come up with ideas for how to save energy here.

<wear a sweater, turn down heat, AC – use fan instead, set temperature on your thermostat up in summer, down in winter, keep doors/windows closed>

I'll draw the rest of this graph and tell you what each section of it stands for, and you tell me how to save energy for that piece.

<hot water – shorter /colder showers; lights – turn off, make compact fluorescent; refrigerator – keep closed; computer & TV – turn off when not using; …>

4. Close: **5 Minutes**

How can kids learn more? Thanks and good-bye! Clean-up.

Today we learned about global warming. We learned that it is caused by carbon dioxide when we waste energy.

I'm gonna give you guys a handout now, and it lists all the things you can do as a third grader to help save energy and prevent global warming. Thanks for letting us visit you!

TOTAL 50 – 60 Minutes

Follow-up – After Presentation

Suggest students report what they will / have done at home to reduce their energy consumption & prevent global warming

Handout attached

Reading Connections:

- Global Warming by Seymour Simon http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=20612
- How We Know What We Know about Our Changing Climate: Scientists and Kids Explore Global Warming by Lynne Cherry and Gary Braasch http://www.amazon.com/Know-What-About-Changing-Climate/dp/1584691034

- 365 Ways to Live Green for Kids: Saving the Environment at Home, School, or at Play – Every Day! By Sheri Amsel http://www.amazon.com/365-Ways-Live-Green-Kids/dp/1605506346
- The Everything Kids' Environment Book: Learn how you can help save the environment – by getting involved at school, at home, or at play by Sheri Amsel http://www.amazon.com/Everything-Kids-Environment-Book-environment/dp/159869670X/ref=pd_sim_b_2
- The New 50 Simple Things Kids Can Do to Save the Earth by Sophie Javna http://www.amazon.com/Simple-Things-Kids-Save-Earth/dp/B003F76HOS/ref=pd_bxgy_b_img_b

HOW YOU CAN HELP

•Drive less / slower / carpool / bike / walk

•Turn down AC – use fan instead

•Turn down heat in winter

•Don't buy products with lots of packaging

•Bring your own bags to the grocery store

•Compost

•Eat foods grown nearby

•Buy fresh foods instead of frozen

•Eat less meat

•Conserve water – turn off water when brushing teeth, take shorter showers

•Turn off appliances when not using them – TV, computer

•Turn off lights

•Use compact fluorescent lightbulbs

•Close refrigerator door / oven door

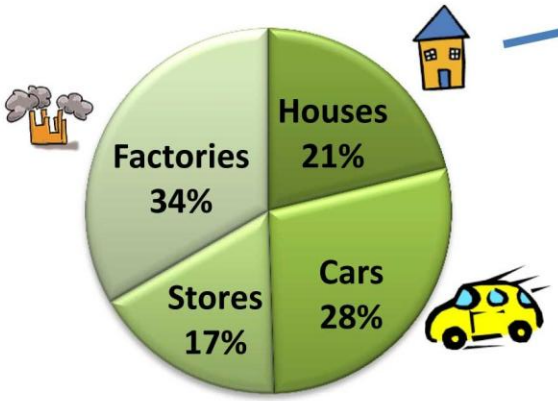
•Dry clothes on clothesline

•Plant a tree

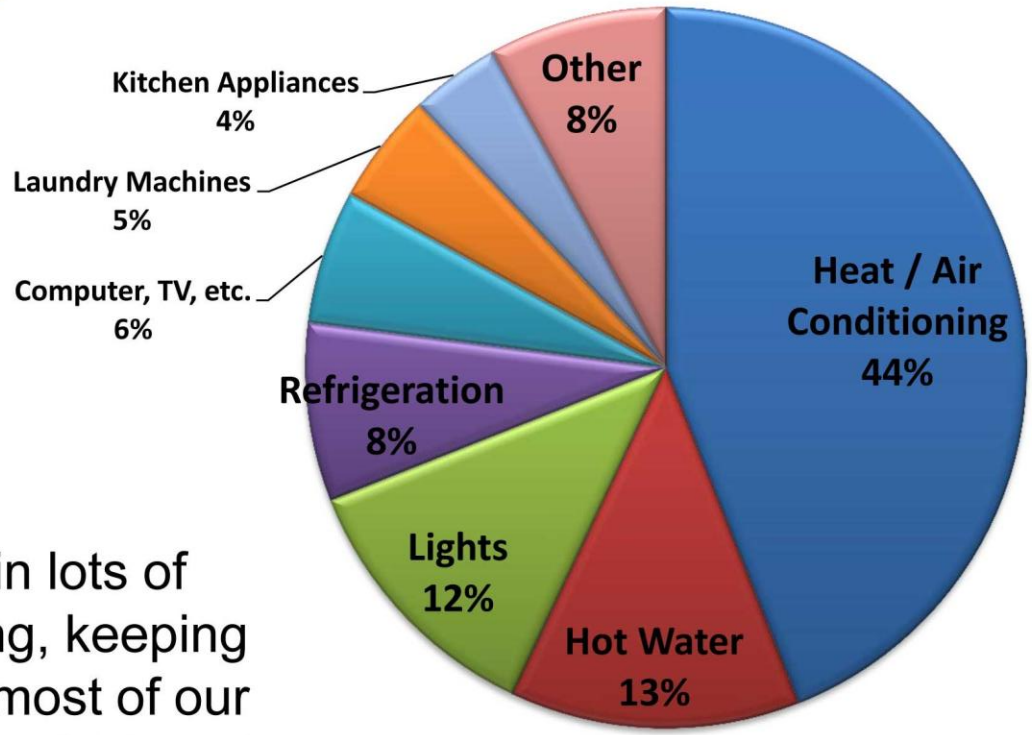
•Recycle paper, plastic, cans, glass.

•Buy less stuff! (Buy used stuff)

Energy Usage in the USA



Energy Usage in Your Home



Global Warming?

Energy makes our lives better in lots of ways (reading at night, travelling, keeping us warm in winter). But today most of our energy comes from fossil fuels, which emit carbon dioxide. Carbon dioxide causes global warming, which threatens to cause more storms & fires and make sea levels rise to flood coastal cities! Help prevent global warming today by saving energy!

For more information about keeping our planet green, see

http://www.climatecrisis.net/

http://www.energyhog.org/