

Final Report to Sonoma Clean Power For Services Provided in 2017-2018

Energy Education Classroom Presentations

1. 3rd Grade-*Water and Energy*

Content

The third grade program has been in place for many years and consists of two, one-hour classroom visits. The first lesson focuses on where our drinking water comes from, water conservation, and storm drain pollution. Beginning in 2018, the second lesson was changed to cover renewable energy and climate change. The new lesson focuses on the connection between water use and the energy needed to pump and move it. Through hands on activities with coal and solar panels, students learn about nonrenewable and renewable forms of energy and the connection to the human enhanced greenhouse effect and global warming. Time is spent at the conclusion of the lesson discussing ways to save water and energy at home. Students received cotton backpacks with the SCP logo on the back.

Schools Scheduled

This program is only available to schools within the Water Agency's service area. **Thirty-one schools received the lesson with a total of 1,775 students.**

Table 1. Classes visited for the 3rd Grade-*Water and Energy* Program

County	Town or City	# of Schools	# of Classes	# of Students
Sonoma	Santa Rosa	14	35	777
	Rohnert Park	3	7	183
	Cotati	1	2	55
	Petaluma	5	8	196
	Sonoma	3	9	179
	Windsor	2	10	241
	Novato	1	3	75
	Penngrove	1	2	59
	Kenwood	1	1	20
TOTAL		31	77	1775

2. 4th Grade–Renewable Energy-Be Part of the Climate Change Solution!

Content

In this new 75-minute classroom presentation, students learned that electricity is generated from different sources of energy and that some are renewable and others are nonrenewable. Students handled a piece of coal to illicit curiosity and conversation about fossil fuels and the connection between their combustion and the release of carbon dioxide into the atmosphere. Graphics were used to illustrate the greenhouse gas effect and the impacts of rampant greenhouse gas emissions on global temperatures. Students learned that a warming earth is connected to sea level rise, more frequent and extreme weather events and changes to the abundance and distribution of plants and animals. Students learned that renewable sources of electricity generation include solar, wind, hydroelectric, and geothermal. Students worked outside in small groups to connect a solar panel to a motorized fan. Students experimented with different materials to help understand how the electrical output of solar panels changes under cloudy conditions, at night, and with reflection. The lesson concluded with a conversation about the steps students can take to reduce the use of fossil fuels like saving water, walking to school, using less plastic, changing a light bulb, and monitoring the temperature inside their refrigerator.

The 4th grade lesson was designed to provide content aligned with the Next Generation Science Standards (NGSS)-a set of standards adopted by the State of California to improve science education for all students. The two subject areas within NGSS that this lesson supports are 1. Energy and 2. Earth and Human Activity. There are also specific Scientific and Engineering Practices that were integrated into the lesson such as: asking questions, developing and using models, planning and carrying out investigations, and constructing explanations.

At the conclusion of the lesson, all students received cotton backpacks with the SCP logo. A subset of students also received 9W LED lightbulbs, refrigerator thermometers with SCP logo, low-water use showerheads, faucet aerators, flow rate bags and dye –tablets for toilet leak detection as part of a take-home water and energy audit that is still in development.

Prior to each lesson, teachers received a confirmation email along with a 3-page document providing information about Sonoma Clean Power, goals of the lesson, a brief overview of the topics covered during the lesson and links to videos and websites related to renewable energy, climate change, and electricity.

Outreach

In August 2017, the 4th grade presentation was advertised in our **Water Education Program Brochure 2017-2018**. Two-thousand, seven-hundred and forty-six brochures were mailed to 190 schools within the Water Agency's Service Area. In addition, a flier highlighting energy

education programs was mailed to 88 schools outside of the Water Agency’s Service Area in Sonoma County and Mendocino County. Emails were sent to all 4th grade teachers in Sonoma and Mendocino Counties with information about the class presentation and a link to sign up. The program was listed on the Water Agency’s website within the Water Education section.

Schools Scheduled

Eighteen schools were visited between January and May 2018, four were located in Mendocino County and fourteen in Sonoma County. A summary of the location and numbers of students is detailed in Table 2 below.

Table 2. Classes visited for the 4th Grade–Renewable Energy-Be Part of the Climate Change Solution! Program

County	Town or City	# of Schools	# of Classes	# of Students
Sonoma	Santa Rosa	8	16	466
	Rohnert Park	1	1	22
	Petaluma	1	6	151
	Cotati	1	1	60
	Windsor	1	7	208
	Cloverdale	1	4	112
	Occidental	1	1	30
Subtotal		14	36	1049
Mendocino	Boonville	1	2	39
	Fort Bragg	1	4	112
	Mendocino	1	2	60
	Potter Valley	1	3	69
Subtotal		4	11	280
TOTAL		18	47	1329

Evaluations

Following the lesson, teachers received an email thanking them for their participation and a link to an online evaluation form. Thirty-three out of forty-seven teachers responded. The evaluations were all positive. There was consensus the hands on activities was the part they liked most and it was suggested the lesson be broken into two visits or one longer presentation. All but one respondent were “absolutely” interested in a repeat visit next year. Here is a quote from one evaluator, “The program was excellent. One of the best I have ever had in my classroom in 22 years of teaching. However, it is a long lesson-my suggestion is to have the lesson in two 45 minute periods over two days...it would give us more time for the solar experiments and for closure of the lesson.”

Field Trip

As part of the 4th grade program, two classes (**60 students**) from Kawana Springs Elementary School were chosen to participate in a field trip to the Sonoma County Landfill followed by a vegetarian lunch at Amy's Drive-Thru. Students learned about the connection between the landfill and greenhouse gas emissions, the importance of recycling, composting, plastic pollution, and the use of landfill gas to generate electricity. Amy's Drive-Thru was chosen as a destination to expose students to a local fast-food restaurant who is operating with climate change in mind and reducing its greenhouse gas emissions in a number of different ways including the use of renewable energy to power its business.

3. Water Awareness Poster Contest

The Water Agency and the Sonoma-Marin Saving Water Partnership host an annual art contest for students in grades 3-6 and the winning artwork is printed in a Water Awareness Calendar and distributed to all teachers within the Water Agency's Service Area. Teachers sign up and receive blank poster boards that students use to create a colorful work of art and slogan encouraging water conservation. This year we added an energy-related theme for 4th graders, ***Save Water to Save Energy!*** *Twenty-three* fourth grade teachers from 15 schools with a total of 548 students participated. The artwork of two fourth grade students was chosen for the calendar and is included as a separate attachment.

4. Teacher Workshop-Climate Literacy and Understanding Global Change

On December 1, 2017 the Water Agency hosted a teacher workshop on climate change at our Westside Education Center. **Twenty-five teachers attended.** Half of the teachers were from local area high schools and the rest were from middle and elementary schools. A few participants were informal educators from local non-profit organizations like LandPaths and Sonoma Ecology Center. Jessica Bean from UC Berkeley shared resources about the greenhouse effect and datasets explaining the causes of global change, and demonstrated how to support student understanding of complex processes through the use of Earth system models for activities, discussions, and assessments. Amy Jolly, from the Center for Climate Protection focused on involving students in solutions to climate change and incorporating STEM projects.

5. ZunZun Musical Assembly Program

Zunzun is a musical assembly that uses humor and music in a lively, interactive show that teaches elementary school students about water conservation, storm drain pollution, climate change, and where local drinking water comes from. During the 2017-2018 school year, the

Water Agency requested topics related to energy and climate change be added to the content of their shows.

Table 3. Schools visited by the ZunZun musical assembly program.

County	Town or City	# of Schools	# of Assemblies	# of Students
Sonoma	Santa Rosa	10	15	4152
	Rohnert Park	3	5	1029
	Petaluma	4	4	1200
	Cotati	1	1	450
	Sonoma	2	3	412
	Windsor	2	4	951
Subtotal		22	32	8194
Mendocino	Fort Bragg	2	4	887
	Potter Valley	1	1	170
Subtotal		3	5	1057
TOTAL		25	37	9251

6. Job Shadow

During the 2017-2018 school year, two students participated in the job shadow program with a focus on energy related work. Each student shadowed Hannah Salafia, an engineer in the Energy Resources section of the Water Agency. Students observed the activities involved in her typical day at work.

Outreach

The job shadow program was advertised in the ***Water Education Program Brochure 2017-2018***. Two-thousand, seven-hundred and forty-six brochures were mailed to 190 schools within the Water Agency’s Service Area. In addition, a flier highlighting the energy education programs was mailed to 88 schools outside of the Water Agency’s Service Area in Sonoma County and in Mendocino County. The program was listed on the Water Agency’s website within the Water Education section.

7. Cartoon Map of Renewable Energy Projects in SCP Service Area

The Water Agency worked with an artist to develop a cartoon map of Sonoma and Mendocino Counties highlighting renewable energy projects in the region. The map is complete and SCP is in the process of printing the map so it can be used as a giveaway at

outreach events and for the Water Education Program to distribute to classrooms teachers through our materials program.