

WEEK OF RESOURCEFULNESS | FAMILY ACTIVITIES

Decreasing our Carbon Footprint through Teleworking and Distance Learning

KEY LEARNING OBJECTIVES

Family members will work together to decrease their carbon footprint and identify new opportunities for teleworking and distance learning instead of commuting to and from work or school.

BACKGROUND

Have you ever thought about the impact driving to work or school every day has on the environment? According to the U.S. Department of Transportation and U.S. Census Bureau, the average commute in the United States is approximately 15 miles and takes 26 minutes each way. A full-time employee who works 5 days a week is adding nearly 4.7 metric tons of CO₂ to the atmosphere each year. That is approximately half the weight of a fully grown elephant! Working from home one day per week would decrease a person's carbon footprint by over half a metric ton per year! The average American uses roughly 1.2 gallons of gas each day. If everyone in the United States worked from home, we could save nearly 30 million gallons of gasoline per day. What if we could telework one day a week or even a month? We would greatly reduce the amount of CO₂ emissions and use less energy and fossil fuels. Using less energy also means we are using less water because water is used in the production of nearly every major energy source. This connection is referred to the **energy-water nexus**.

PLAN

In this activity, the family will develop a telework plan to reduce the number of times they would drive to work or school, reducing the amount of overall greenhouse gas emissions, fossil fuel consumption, and energy use. The family will begin by developing a list of activities that could and could not be done via the internet for both work and school. They will identify vehicles that are used for commuting and determine the round-trip commute in miles. They will calculate the gas required for each vehicle per day, week, and year. Using this data, they

will determine the yearly gasoline savings for each family member based on telecommuting once per week or more frequently. They will use this data to write a letter to their supervisor or superintendent of schools to propose a change in their work or school schedule.

DESIGN

What are the materials you will need to get started?

- Printed “Commute Log” and “Telework Log”
- Calculator
- Internet connection

INNOVATIVE THINKING

1. As a family discuss how each member gets to and from work or school. What type of transportation is used to commute? Would it be feasible to use alternative methods such as mass transit or carpooling? What type of activities at work or at school could be done at home? When would it be necessary to commute to work or school?

CREATE

2. Before you begin developing your telework plan, decide which family member will have each of the following roles:
 - **Navigation Specialist**—is responsible for calculating the commuting miles using Google maps or another resource
 - **Data Analyst**—is responsible for entering the family member names and data
 - **Mathematician**—is responsible for any calculations required in the data tables
 - **Environmental Engineer**—is responsible for overseeing all the data entry and reviewing calculations
3. To complete the “Commute Log” data tables, have the data manager add the names of each family member and the number of days worked per week. The navigation specialist will use Google maps or another program to calculate the average daily commute in miles and record that in the data table. The environmental engineer will determine the weeks worked for each employee and student and enter this data in the table. Finally, the mathematician will calculate the average weekly commute and total miles commuted per year and enter this in the table. Next, have the data manager transfer the total miles commuted per year into the “Commuting Carbon Footprint” data table. The mathematician will calculate the total CO₂ per year in both grams and tons and enter this data in the table. If a fully grown elephant is 7 metric tons, how many elephant’s worth of CO₂ does your family release into the atmosphere each year?

4. Before completing the telework plan, discuss how many days per week each family member could feasibly work from home. Have the data specialist enter the names of the family members and data calculated from the “Commute Log.” The mathematician will perform the calculations to determine the decrease in mileage, decrease in carbon footprint, and gasoline savings per year. The environmental engineer should review the data entries and calculations.
5. Finally, work together to develop your telework plan on a monthly calendar and decide what to do with the money you will save by reducing the amount of gasoline per year!

NEXT STEPS

To extend this activity, write a letter to your boss or superintendent of schools and propose a change in your work or school schedule to include teleworking. Discuss the benefits teleworking has on the environment and the financial savings in reducing the use of fossil fuels and electricity. You could also conduct research to determine health and productivity benefits to working at home.

RESOURCES

<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

<https://www.census.gov/library/visualizations/interactive/travel-time.html>

<https://www.nrc.gov/docs/ML1006/ML100621425.pdf>

<https://www.carbonfootprint.com>

YEARLY COMMUTING MILES

Family Member	Daily Commute (miles)	X	Days Worked (per week)	=	Weekly Commute (miles)	X	Weeks Worked (per year)	=	Total Miles Commuted (per year)
Average Employee	30	x	5	=	150	x	47	=	7,050
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
TOTAL FOR FAMILY:									<input style="width: 100px; height: 20px;" type="text"/>

YEARLY COMMUTING CARBON FOOTPRINT

Family Member	Total Miles Commuted (per year)	X	CO ₂ Average Car (grams/mile)	=	Total CO ₂ per year (grams)	X	Grams in a Metric Ton	=	Total CO ₂ per year (metric tons)
Average Employee	7,050	x	404	=	2,848,200	x	1,000,000	=	2.85
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
TOTAL FOR FAMILY:									<input style="width: 100px; height: 20px;" type="text"/>

Decreasing our Mileage

YEARLY COMMUTING MILES									
Family Member	Daily Commute (miles)	X	Days Worked (per week)	=	Weekly Commute (miles)	X	Weeks Worked (per year)	=	Total Miles Commuted (per year)
Telework Employee	30	x	3	=	90	x	47	=	4,230
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
TOTAL FOR FAMILY:									<input type="text"/>

Decreasing our Carbon Footprint

COMMUTING CARBON FOOTPRINT									
Family Member	Total Miles Commuted (per year)	X	CO ₂ Average Car (grams/mile)	=	Total CO ₂ per year (grams)	X	Grams in a Metric Ton	=	Total CO ₂ per year (metric tons)
Telework Employee	4,230	x	404	=	1,708,920	x	1,000,000	=	1.71
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
TOTAL FOR FAMILY:									<input type="text"/>

Savings in Gasoline

COMMUTING CARBON FOOTPRINT									
Family Member	Miles <i>Not</i> Driven (per year)	X	Average Car Fuel Economy (miles/gallon)	=	Gasoline Saved (gallons)	X	Average Price of Gasoline	=	Total Amount Saved (pre year)
Telework Employee	2,820	x	25.1	=	112	x	\$2.60	=	\$292
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
		x		=		x		=	
TOTAL FOR FAMILY:									<input type="text"/>