

THE COST OF PERSONAL TRANSPORTATION

Purpose:

The goal of this activity is to identify the true “cost” of transportation – how much **carbon dioxide** (CO₂) is emitted into the atmosphere due to our travel? By the end of this activity try to identify ways we can reduce CO₂ **emissions** by changing our behavior and modes of transportation.

Background:

Americans represent 5% of the world's population but drive almost 1/3 of its cars that create nearly 1/2 the CO₂ pumped out of all exhaust pipes into the atmosphere each year. US cars play a large role in **global warming** because they waste more fuel than passenger vehicles (on average they emit 15% more carbon dioxide), are used less efficiently (driving when the car is not full of people) and because they are driven further per year (average 11,000) than any other country in the world.

Due to the accessibility of cars in the USA people are willing to live further away from where they work. As a result, cities build out rather than up resulting in an issue called **suburban sprawl**. With suburban sprawl far outpacing the growth of public transport networks, Americans are commuting further and further each year.

All this traveling around a city results in increased traffic. As traffic increases, the amount of time a car spends idling increases as well. A car actually emits more CO₂ when it is **idling** than when it is **driving**. Drivers could reduce CO₂ emissions by turning off their engines when cars were idle for more than one minute (e.g. waiting at RR tracks, in a stand-still traffic jam, drive-thru restaurants/banks, in carpool line).

AVERAGE FUEL CONSUMPTION

US Dept of Transportation, Bureau of Travel Statistics

Bicycles alternatively fueled

0 pounds of CO₂ per 100 miles

Scooters 70 mpg avg mpg

27.95 pounds of CO₂ per 100 miles

Motorcycles 50.1 avg mpg

39.13 pounds of CO₂ per 100 miles

Passenger Cars 21 avg mpg

54.98 pounds of CO₂ per 100 miles

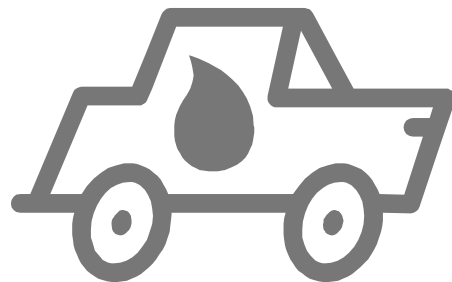
Light Truck/SUV 15 avg mpg

78.49 pounds of CO₂ per 100 miles



Procedures:

1. Choose a parking lot and survey the type of vehicles parked in the lot.
2. Compare the types of vehicles with average CO₂ emissions for the type of vehicle, such as car, truck, SUV (see the statistics from the US Dept of Transportation).
3. Survey local commuters on campus to determine the average amount of miles driven to campus each day and the mode of transportation people use daily.
4. Calculate average amount of CO₂ emissions for each type of vehicle in the parking lot using the statistics for CO₂ emissions per 100 miles for a 5 day work/school week.
5. Using the data collected from people on campus, calculate that average amount of CO₂ emissions for each type of transportation in a 5 day work/school week.



Additional resources

The real cost of driving a car

<http://www.oasisdesign.net/transport/cars/cost.htm>
mpg calculator

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<http://www.fueleconomy.gov/feg/findacar.htm>

make and model average CO2 emissions

<http://www.terrapass.com/carbon-footprint-calculator/>

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Survey of Vehicles on Campus Location: _____

Type of Vehicle		Calculations				
Make	Model	<i>randomly selected miles driven per day</i>	<i>miles driven per school/work week (previous column x 5)</i>	Divide Answer by 100 (conversion factor)	Multiply answer by lbs of CO2 per 100 miles per type of vehicle (see Table 2 below)	Avg amount of CO2 emissions (in lbs per week)
<i>Toyota</i>	<i>Corolla</i>	30	150	$150 / 100 = 1.5$	$1.5 \times 54.98 = 82.47$	82.47
		12	60	0.60		
		19	95	0.95		
		26	130	1.3		
		48	240	2.4		
		2	10	0.10		
		17	85	0.85		
		30	150	1.5		
		6	30	0.30		
		13	65	0.65		
		24	120	1.2		
		16	80	0.80		
		66	330	3.3		
		20	100	1.0		
		14	70	0.70		
		40	200	2.0		
		9	45	0.45		
		15	75	0.75		
TOTALS	# of cars _____	407	2035	NA	NA	

Table 2 -- CO2 per 100 miles per type of vehicle

type of transportation	average MPG rating for type of transportation	CO2 emissions per 100 mi
bicycle	NA	0
scooter	70	27.95
motorcycle	50.1	39.13
passenger car	21	54.98
truck	15	78.49

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SUV	15	78.49
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Approach a person on campus and begin the following dialog:

“This will only take less than 30 seconds of your time. Will you answer a couple questions, please?” We are surveying people on campus about transportation to determine the amount of CO2 emitted each year by the people on this campus.

1. Are you Faculty, Staff, or Student of the university?

Faculty	Staff	Student

2. How do you generally get to the university? How far do you typically travel in one day (roundtrip)?

Type	0-10 miles	10-20 miles	20-30 miles	30-40 miles	>40 miles	Totals
Walk or Bike						
Totals						
Car						
Totals						
SUV/Truck						
Totals						
Bus						
Totals						
Motorcycle						
Totals						
Scooter						
Totals						

3. Can you tell me why you choose this mode of transportation? What might cause you to change that mode of transportation? (Examples of previous answers: no car so can't drive; drive because too far to take bus/ride bike; walk because I live on campus; TARC 3 schedule too flexible for my schedule; gas too expensive so I ride bus)

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4. Calculate the average amount of CO₂ emissions for each type of transportation in a 5 day work/school week.

Walking/Biking

Absolutely no CO₂ emission impact!

Scooters

Total # Miles traveled per day: _____

Multiply answer by 5 days in a work/school week: _____

Divide answer by 100 (for conversion factor): _____

Multiply answer by 27.95 (# of lbs of CO₂ per 100 miles for **scooters** from other side of worksheet): _____

Motorcycles

Total # Miles traveled per day: _____

Multiply answer by 5 days in a work/school week: _____

Divide answer by 100 (for conversion factor): _____

Multiply answer by 39.13 (# of lbs of CO₂ per 100 miles for **motorcycles** from other side of sheet): _____

Car

Total # Miles traveled per day: _____

Multiply answer by 5 days in a work/school week: _____

Divide answer by 100 (for conversion factor): _____

Multiply answer by 54.98 (# of lbs of CO₂ per 100 miles for **cars** from other side of worksheet): _____

Light Truck/SUV

Total # Miles traveled per day: _____

Multiply answer by 5 days in a work/school week: _____

Divide answer by 100 (for conversion factor): _____

Multiply answer by 78.49 (# of lbs of CO₂ per 100 miles for **truck/SUV** from other side of sheet): _____

* **Total** the pounds of CO₂ for every mode of transportation in one week: _____

5. There are over 80 parking lots on this campus and many vehicles only carry one person. What are some ways that we can help reduce the amount of CO₂ emissions?

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