

# ESA 21: ENVIRONMENTAL SCIENCE EXERCISES

## Ozone: Module Capstone Activity

### Capstone Activity

#### Nitrogen Oxide Calculator

You have already analyzed your emissions of smog-forming compounds from your vehicle, but it's important to realize that this is not your only contribution of these pollutants. Nitrogen oxides and hydrocarbons are also released by coal-fired power plants, natural gas combustion, gas-powered lawnmowers, and other sources. In the Capstone Activity for this module, you will be analyzing your nitrogen oxide emissions from these sources, combining them with your vehicle's emissions, and estimating your total emissions of smog-forming NOx.



We will begin by having you determine the nitrogen oxide emissions from electricity. We will do this with an [Online Electricity Pollution Calculator](#) from the Environmental Law and Policy Center of the Midwest.

Electricity Pollution Calculator:	
1.	Enter the <i>average</i> monthly cost of your electric bill during the year.
2.	Select <b>Nebraska Average</b> from the pull-down menu of electricity companies. The reason for this choice is explained below.
3.	Hit the <b>Calculate</b> button.
4.	The pie chart that appears shows the energy sources used to generate electricity in Nebraska, and the percentage of total electricity generated by each. These proportions, and the cost of electricity per KWH, are extremely similar to Georgia's, making this category a good representation of local conditions.
5.	Scroll down the page to the section on <b>Nitrogen Oxide</b> to view your results.
6.	Enter your results on the Capstone Activity Sheet and answer the associated questions.

## Total Emissions of Nitrogen Oxide

**DO NOT COMPLETE THIS SECTION UNTIL YOU'VE COMPLETED THE ACTIVITY ABOVE.**

You now know your NO<sub>x</sub> emissions from the two major sources - driving and electricity. Let's now fill in a few details and look at your overall emissions. To do this, we will use our [Online Nitrogen Oxide Calculator](#).

Online Nitrogen Oxide Calculator:	
1.	Enter the emissions from driving (Tailpipe Tally).
2.	Enter your values for the listed factors, and obtain your total emissions.
3.	Print the Calculator page and complete the related questions on the Capstone Activity Sheet.

### Internet Addresses of Linked Sites:

*Online Electricity Pollution Calculator:* <http://www.elpc.org/polCalc/index.htm>

*Online Nitrogen Oxide Calculator:* <http://science.kennesaw.edu/~jpratke/sci1101lab/noxcalculator.htm>

# ESA 21: Environmental Science Activities

Ozone  
Capstone Activity Sheet

Name:

Professor:

*Attach your runs of the Online Nitrogen Oxide Calculator to this sheet.*

## **Nitrogen Oxides from Electricity:**

(a.) Enter the results from the calculator in the table below. List your average monthly electric bill, the annual NO<sub>x</sub> emissions (from the left side of the page beneath the "Nitrogen Oxide" heading), and the driving equivalent of these emissions.

Monthly Electric Bill (\$)	Annual NO <sub>x</sub> (lbs.)	Driving Equivalent (mi.)

(b.) Seattle, Washington, is about 2,600 miles from Atlanta by car. How many one-way trips from Atlanta to Seattle is your driving equivalent due to electricity?

## **Number of trips from Atlanta to Seattle:**

Are you surprised by the driving equivalent of your electricity pollution? Explain why or why not.

## **Online Nitrogen Oxide Calculator:**

(a.) List your total annual emissions and the driving equivalent in the table below.

Total Annual NO <sub>x</sub> emissions (lbs.)	Driving Equivalent (mi.)

How do your NO<sub>x</sub> emissions compare to those of the average American? If your emissions are appreciably higher or lower than the average, explain why *you* think yours is higher/lower.

(b.) Make one reasonable change in your lifestyle that affects one of your two largest categories of NO<sub>x</sub> emissions (likely driving and electricity), and run the calculator again. If the change involves driving or electricity, you should revisit the appropriate web site and run the calculator again with your change. Describe the change below, and how it affected your total emissions.