CLASS 3
INTRODUCTION AND LIST OF RESOURCES

I. Introduction

The third class teaches the students about electricity, electric power generation, pollution from coal fired power plants and some of the ways this pollution can be reduced. The class also introduces concepts that will be used in the next class, such as cap and trade. The class has two related experiments/demonstrations, one demonstrates static electricity and the other demonstrates how an electrostatic precipitator works.

We have annually invited a representative from the local power plant to come and talk about power generation with the students (in our case the power company is PEPCO). This has generally worked quite well, as the PEPCO representative has always come armed with glossy pictures, diagrams and samples of fly ash and coal. It also is an opportunity for the students to meet a professional engineer. However, this is certainly not necessary for the class, and some years the PEPCO representative could not make it. Thus, we have provided two outlines, one that incorporates the PEPCO representative and another that teaches the entire class. Be aware that there is a need to manage the time of the power plant representative, and to interject with explanations or questions if the students are having difficulty understanding him/her.

The handouts for the class are included electronically with this packet. One of them is also available from the Edison Electric Institute at http://www.eei.org/industry_issues/environment/air/New_Source_Review/coal1.pdf. We recommend making 1 copy for every student, because one of the diagrams is quite detailed, and thus hard to share.

The first experiment demonstrates static electricity with a balloon and black pepper. It consists of rubbing a balloon against your hair or clothes to build up a static charge, and then holding the balloon above a plate of black pepper. The pepper flakes will cling to the charged balloon. It is fun because it engages the students and lets them do the experiment themselves. We recommend providing one balloon and one plate of pepper for every 3 students. It provides an excellent tool for discussing static electricity and flows right into the second experiment.

The second experiment illustrates how an electrostatic precipitator works using a blowdryer and black pepper. The details of the electrostatic precipitator experiment are described in the accompanying documents for this class. Unfortunately, it is not an activity that the students can do themselves in groups, because it requires a blowdryer. However, it is entertaining enough that it seems to make up for that flaw. Because it requires some specialized materials, be sure to gather the materials a week before class. Be sure also to do a test run of the experiment ahead of time, so that you are familiar with the experiment.

Tips:

- Remember to bring copies of the 2 diagrams as handouts.
- Confirm with the representative from the power plant that he/she will be there that day.

II. Resources

If you are not familiar with all or some of the concepts, simply would like a refresher, or desire plenty of ammunition for responding to questions, below are some good internet resources. Additionally, some of the resources for the other classes overlap with Class 3's topics. Likewise, see the Resources section of the Introduction to the Class Series for general resources and teaching materials.

EPA

Air - http://www.epa.gov/ebtpages/air.html
Acid Rain - http://www.epa.gov/ebtpages/airairpolacidrain.html
Kids Page - http://www.epa.gov/acidrain/site_students/index.html

DOE - Energy Information Administration

General - www.eia.doe.gov
Kids Page - http://www.eia.doe.gov/kids/index.html

Texas Commission on Environmental Quality

How to Make an Electrostatic Precipitator - http://www.tnrcc.state.tx.us/air/monops/lessons/precip.html
Diagram - http://www.tnrcc.state.tx.us/air/monops/lessons/precip.gif

Environmental Defense

Air Quality - http://www.environmentaldefense.org/system/templates/page/issue.cfm?subnav=5

Edison Electric Institute

Homepage - www.eei.org
Handbook to Electricity Industry - http://www.eei.org/industry_issues/industry_overview_and_statistics/nonav_key_facts/index.htm
Diagram - http://www.eei.org/industry_issues/environment/air/New_Source_Review/coal1.pdf

Miscellaneous

How Power Distribution Grids Work - http://people.howstuffworks.com/power.htm/printable
Static Electricity - http://www.sciencemadesimple.com/static.html