

1.

## NATURAL RESOURCES

Electricity starts with natural resources like coal, oil, natural gas, and wind. Power plants get these materials from all over the world and turn them into different forms of energy to be used right here in New York City. Extracting these materials has serious impacts on the local environment, from oil spills to contaminated local water supplies.

Where does New York City's electricity come from? In 2011, the Center for Urban Pedagogy (CUP) worked with public high school students to trace our electricity from the outlet back to its sources. We interviewed engineers, operations managers, and advocates. We visited local utility company headquarters, an upstate transmission monitoring center, and plenty of power plants—from Astoria to Co-op City. We've created this poster to break down what we learned along the Power Trip.

2.

## SUPPLIERS

They're the companies that get the natural resources to the power plants. For example, BP is an oil supplier. They drill for oil all over the world and ship it to power plants that use the oil as a raw material to generate electricity. Transporting the natural resources long distances impacts the environment, too.

3.

## ENERGY HUBS

Fossil fuels have to be stored before they're used. Sometimes, it works like a supermarket where each customer (a.k.a. power plant) buys what it needs in order to produce energy. Sometimes, the natural resources are delivered directly to the power plants and stored on-site.

4.

## GENERATORS

GENERATION is the process of turning raw materials into usable electricity. There are lots of ways to generate electricity, from power plants to wind farms to hydropower. THE GRID is how people usually describe our electricity system, from power plants to power users.

## 4C. HYDROPOWER PLANT

That's when energy is created from huge amounts of water flowing through a dam. The water's energy is harnessed by a power plant to produce electricity. New York City gets about 10% of its electricity from hydropower, from plants as far away as the US / Canada border.

## 4B. NUCLEAR POWER PLANT

New York City gets up to 20% of its energy from the Indian Point Nuclear Power Plant in Buchanan, NY, 40 miles north of the city. Nuclear Power is relatively cheap to produce because you only need a small amount of uranium to generate the same heat as fossil fuel. But many think safety is a big issue with nuclear power.

## 4A. FOSSIL-FUELED POWER PLANT

New York City gets most of its electricity from fossil-fueled power plants. Power plants buy fossil fuels from suppliers and burn them to unlock the energy stored inside. Burning fossil fuels like coal contributes to air pollution and asthma in the neighborhood where the power plant is. This process also releases carbon dioxide into the air, which causes climate change.

## 4E. COMBINED CYCLE POWER PLANT

Combined cycle power plants still burn fossil fuels, but they are more efficient than older plants. That's because the leftovers from gas generation are used to make steam, which is used to generate even more electricity. The Astoria Energy Cogeneration Plant produces about 10% of New York City's load.

## TRANSMISSION SUBSTATION

This is the last stop before electricity gets sent over transmission lines. It's the first step in the TRANSMISSION process. It's where voltage is supercharged so that it can travel far. There are around 15 transmission substations in New York City.

## 4D. WIND FARM

Wind farms don't need power plants. They are their own generators and their electricity costs very little because wind is FREE! But wind turbines take up a lot of space and need to be located on large open areas of land or water. They collect energy from the wind and send it along through transmission lines into the power grid.

6.

## HIGH VOLTAGE LINES

These carry high voltage electricity long distances above ground from the power plants to your local area. You won't see these in the city because it's dangerous to have high voltage close to where people live. If the lines fell, it would be shocking!

7.

## AREA SUBSTATION

To DISTRIBUTE electricity to neighborhoods, area substations take in the electricity and reduce the voltage. That way, extremely high voltage isn't flowing through neighborhoods. There are 61 area substations in NYC. You might have one right next to you and not even know it. Utility companies often make them look like regular buildings or houses so they blend into the neighborhood.

8.

## POWER LINES

These are smaller power lines that carry electricity from area substations to where you live. If you live in a neighborhood where there are a lot of apartment buildings, the lines are probably hidden underground. If you live in an area where houses are more spread out, you can probably see some power lines above the street.

9.

## TRANSFORMER

Transformers are big boxes under your street that take the electricity traveling through the power lines and lower the voltage one more time so you can use it in your home.

## FEEDER

Feeder cables bring the electricity traveling through wires to our electrical sockets. The 2006 Queens blackout was caused when some of Con Edison's feeder cables in Long Island City failed because they were very old. The remaining feeders then overloaded and caused outages and brownouts for 174,000 people.

## ELECTRICAL METER

Your meter records how much electricity you actually use. If you reduce your energy use, your energy bill will go down, and your impact on the whole system will be lower. Power plants watch how much you use, and generate less electricity if you use less. For example, lots of generators get turned off in the spring because there's less demand than in summer or winter.

## ELECTRICAL SOCKET

We plug our electrical devices into sockets to use electricity from the grid.

YOU!

You use electricity, but so does everyone else! So imagine your individual use multiplied by ten million. Everyone's individual electricity use put together adds up to New York City's energy load. You can choose how much electricity you use, and that impacts the amount of energy that needs to be produced in the first place.

## HOW DOES ELECTRICITY GET TO ME?

## TRIP

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11.

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10.

The Center for Urban Pedagogy (CUP) is a non-profit organization that uses the power of design and art to improve civic engagement. Urban Investigations are CUP's project-based after-school programs in which high school students explore fundamental questions about how the city works. Students collaborate with CUP and teaching artists to create multimedia teaching tools that reach audiences in the arts and social justice.

This project is made possible by the Greening Western Queens Fund of The North Star Fund. Additional support provided by public funds from the National Endowment for the Arts and the New York City Department of Cultural Affairs in partnership with the City Council, and the Bay and Paul Foundations.

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Thanks to our Interviewees: Dave Stone (Riverbay Corporation), Anthony Giancatarino (Center for Social Inclusion), Brian Heinbaugh (Astoria Energy), Griffin Reilly and Milovan Blair (Con Edison), Kenneth Klapp (New York Independent System Operator)

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