Urban Planning - Class Period 03

Goal: Students need to understand the meaning of **"public utilities"**. (Another word they should know is "**infrastructure**." - this concept includes roads and public transportation, in addition to public utilities.) Sometimes, public utilities are called "civics". Ask your students: "Where does the water in the sink come from?" (They have the most amazing answers!!!!) How do we get electricity/power? Where does the sewage/garbage go?

SimCity 5: There are many, many things students need to know about public utilities for the game. Look for a separate GoogleDoc on that topic.

Engineering: You can, actually, get a masters degree in Environmental Engineering with an emphasis on Water, Wastewater and Storm water Engineering. Most programs have changed their programs to include all of these things in their Environmental Engineering degree. It sounds nicer, don't you think?

In addition to Electrical Engineers, here are Nuclear Engineers, Wind Power Engineers, and Petroleum Engineers, all of whom work on the creation of power.

Activity Suggestion: Divide students into groups and have each research (20 minutes), prepare a report (20 minutes) and share out to the class (20 minutes).

Topic	Common Questions
Water	Where does it come from? How does it get to you? How is it measured? How is it paid for? Where does it go?
Power	http://www.need.org/intermediate This publication is 68 pages. Covers every different type of energy. I do an energy unit later in the year so I try not to let the students get too deep into this.
Garbage	Recycle? What is recycle-able? What does recycled plastic become? Is that healthy?
Storm water	We do a field trip to the Los Angeles County Joint Water Pollution Control Plant in Carson where students learn about storm water and wastewater. San Diego has a series of videos http://www.sandiego.gov/thinkblue/news/videos.shtml
Waste water	

Students often ask me “What does the city government do?” One of the things I explain is the difference between small cities which are typically “contract” cities, and large cities, which are Full Service cities.

1. In the real world, small cities can choose which companies can supply utilities. Check out this page from La Canada Flintridge to see how this works. LCF

2. In "Full Service" cities, the city actually provides utility services. Take a look at the City of Downey for an example of that.

Power:

In addition to Federal regulation of energy, California has its own state agency: The California Energy Commission. Commissioners are appointed for 5 year terms by the Governor and they don't have to know anything about power to be appointed, although it seems like that would be helpful. The Commission is charged with:

- Forecasting future energy needs;
- Promoting energy efficiency and conservation by setting the state's appliance and building efficiency standards;
- Supporting public interest energy research that advances energy science and technology through research, development and demonstration programs;
- Developing renewable energy resources and alternative renewable energy technologies for buildings, industry and transportation;
- Licensing thermal power plants 50 megawatts or larger;
- Planning for and directing state response to energy emergencies.

Here's the CEC's map of California showing the different types of power plants here in California. Just using this map, what do you see is the main type of power being generated in the Los Angeles area?

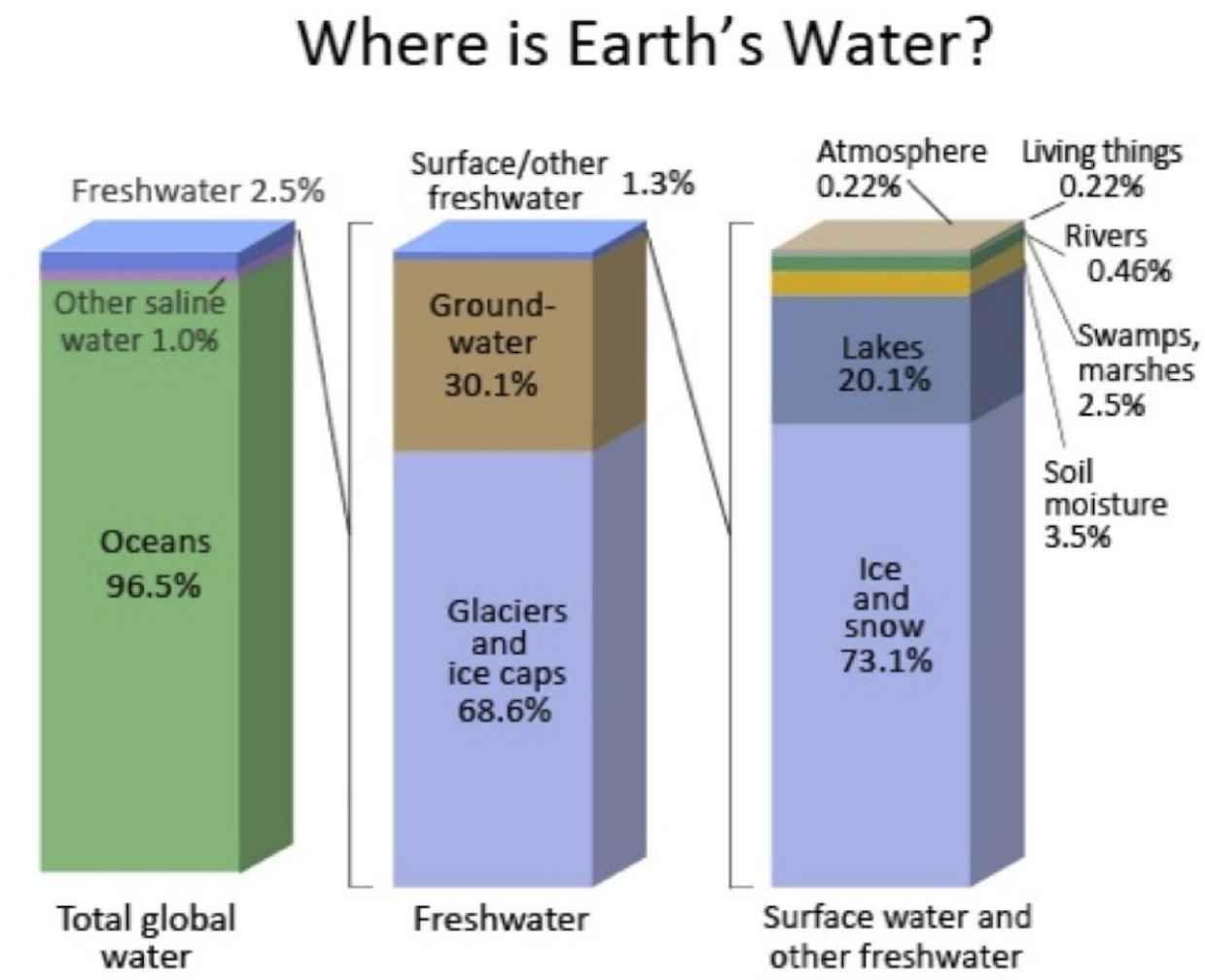
If renewable energy is energy we can make more of forever, and non-renewable energy is energy made from a resource that can be used-up, what kind of energy is Los Angeles using the most?

Water:

The U.S. Geological Survey (USGS) has statistics on everything Earth! Here is the Middle School Friendly reading on [their website about water on Earth.]

When you are finished with that, check out the graph and the table below and answer the questions.

Distribution of Earth's Water



1. What is the percentage of fresh water on Earth?
2. Where is most of that fresh water?
3. Of the water on the surface of the planet, what percentage is in lakes? What percentage is in the atmosphere?

One estimate of global water distribution

Water source	Water volume, in cubic miles	Water volume, in cubic kilometers	Percent of freshwater	Percent of total water
Oceans, Seas, & Bays	321,000,000	1,338,000,000	--	96.5
Ice caps, Glaciers, & Permanent Snow	5,773,000	24,064,000	68.6	1.74
Ground water	5,614,000	23,400,000	--	1.7
Fresh	2,526,000	10,530,000	30.1	0.76
Saline	3,088,000	12,870,000	--	0.93
Soil Moisture	3,959	16,500	0.05	0.001
Ground Ice & Permafrost	71,970	300,000	0.86	0.022
Lakes	42,320	176,400	--	0.013
Fresh	21,830	91,000	0.26	0.007
Saline	20,490	85,400	--	0.007
Atmosphere	3,095	12,900	0.04	0.001
Swamp Water	2,752	11,470	0.03	0.0008
Rivers	509	2,120	0.006	0.0002
Biological Water	269	1,120	0.003	0.0001

Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources (Oxford University Press, New York).

Using this table, answer the following questions:

4. Where did the information for this table come from? Do you think it is reliable? Why or why not?
5. Do you know what "permafrost" is? If not, you should look it up here on NOAA's website (pronounced "Noah" but it stands for National Oceanic and Atmospheric Association) here.
Now that you know what permafrost is, what percentage of fresh water is "ground ice and permafrost"? Read carefully before answering.
6. How much of Earth's total water is in rivers?

In SimCity 5, you can see where the aquifer (underground water) is in your area. You might want to think about checking that before you start building your city. When you are putting down your water tower, drag it around a bit and see how the amount of water you can get changes depending upon where you put it. (It must be on the street because utilities flow from the streets in SC5). When you put down your sewage disposal plant, be sure it is not dumping into your water source! Ewwww.