

Teacher(s): Liz Hudd	Unit Title:
Subject: Environmental Science	Lesson Title: Electro
Grade Level(s): 11/12	Lesson Length:
Date(s): July 2014	

- Learning Goal(s)** [What should students know, understand, or be able to do as a result of this lab or activity.]
Students will explore energy policy and decision making around balancing the various aspects of city development and energy consumption.
- Energy Connection** [How is this lesson connected to energy or renewable energy concepts.]
Exploring the different kinds of energy, both renewable and non-renewable, positives and negatives.
- Connection to Standards** [List local, state, and/or national standards addressed by this lab or activity.]
Human activities can deliberately or inadvertently alter ecosystems and their resiliency. Discuss environmental laws, ethics and policies
Compare and contrast conventional and sustainable energy sources.
Evaluate the pros and cons of fossil fuel and renewable energy resources.
- Materials and Resources**
Electrocity simulation
A Struggle for Power in China: The Three Gorges Dam- National Center for Case Study Teaching in Science Case Study
- Procedure**

PART 1.

In part one you will be using an online game, called ELECTROCITY, to examine issues related to energy management for a small municipality. ElectroCity is an online computer game that lets players manage their own virtual towns and cities, while teaching players about energy, sustainability and environmental management. The game was developed by Genesis Energy, a leading generator and retailer of energy in New Zealand. Genesis generates electricity from a range of sources including gas, coal, wind and water (But not nuclear power which is not allowed in New Zealand).

1. Go to: <http://www.electrocity.co.nz/HowToPlay/>
2. Read the instructions on HOW TO PLAY.
3. Start a new game, and give your town a name.
4. Continue playing the game by making changes to your city and clicking “next turn”. The game lasts for 150 turns.
5. Make a T-chart with Action on the left of the T and then write the effect of the action and identify whether it was Pro or a Con- look at the different characteristics within the

game like smiley faces, income, coal or gas production, energy production, energy consumption.

6. At the end of the game, record your scores for: Energy management, Popularity, Population, Environment, and Overall Score

7. Click on the option to “Save and Show Off”.

Enter Your Name and Enter Teacher Code:

This will submit your results to your instructor.

Part 2.

Read the background information in the Case Study: Three Gorges Dam

Working in teams, you will investigate the costs of and benefits from the Three Gorges Dam in greater depth, focusing on ecological, economic, or social impacts. After you collect information, your group will weigh the pros and cons to decide whether, as a group, you support or oppose the construction of the TGD. As a group, you will prepare a persuasive presentation (3–5 minutes) based on your research of the ecological, economic, or social impacts; try to avoid discussing issues related to the other topics. Your goal is to convince the rest of the class to join you in either supporting or opposing construction of the dam.

Some Tips

Search Google Scholar for journal articles and reports related to the topic. Use websites only when you cannot find peer-reviewed sources.

Get the full citation for each reference you use, whether it is a journal article, website, or report. Cite all information that you obtain from other sources on the slides you prepare and in a Literature Cited document you will turn in.

When information about TGD is not available, try to find information about another dam. Be sure to identify the dam you are using for comparison, and discuss how you would expect this information to be related to what is/was occurring in the TGD system.

Some Topics to Get You Started

Ecological:

Direct and indirect impacts to aquatic and terrestrial plants and animals: common, endemic, threatened, keystone species, used for food, etc.

Impacts to the ecosystem: food web, ecosystem services

Habitat changes due to damming: feeding areas, breeding areas, natal habitat

Economic:

Direct costs of dam construction and maintenance, direct benefits of energy production, growth development of population and comparison to other energy forms

Indirect costs for human relocation, ecosystem services, food species/habitat loss, etc.

Indirect benefits from improved navigability, lowered flood risk, tourism, etc.

Social:

Impacts of human relocation and career changes (locals were evacuated and forced to relocate, but the dam provides some jobs)

Impacts to agriculture and food availability (irrigation vs. crops that require annual flooding)

Other factors: flood safety, river navigation, aesthetic value, loss of archaeological sites

Political and social factors related to site selection and treatment of the local people

- **Technology Integration** [List and/or describe the technology that will be used and how it will be integrated into the lesson.]
- **Modeling & Guided Practice** [List and/or describe any modeling or guided practice]
- **Checks for Understanding** [Identify when and how checks for understanding will be done.]
- **Independent Practice** [List and/or describe any work students will be asked to do independently to reinforce the learnings associated with this lesson.]
- **Assessment & Closure** [Describe how this lesson will be brought to a close and how student understanding will be assessed.]

Replay Electricity using the principles you learned for a score and answer the following questions:

1. Could a dam like Three Gorges be built?