Curriculum Map for Justice-Oriented Teaching

Unit Title: Energy Sources **Discipline: Science** **Grade: 8**

Social Justice Goals/Rationale:

Within this curriculum unit, the students will learn the different sources of energy and how each is created (solar, wind, fossil fuel, nuclear, etc).
They will learn the advantages and disadvantages of using the different sources of energy.
The students will develop energy awareness and apply the knowledge learned to conserve energy within their community, making suggestions for improvements in energy efficiency.

Stage 1 – Desired Results

Relevant Standard(s): *Include the number and full text of the standards you plan to address*

NS.5-8.2 As a result of their activities in Grades 5-8, all students should develop an understanding of
- Properties and changes of properties in matter
- Transfer of energy

NS.5-8.5 As a result of activities in Grades 5-8, all students should develop
- Understandings about science and technology

NS. 5-8.6 As a result of their activities in Grades 5-8, all students should develop understanding of
- Personal health
- Populations, resources, and environments
- Natural hazards
- Risks and benefits
- Science and technology in society

NT.K-12.1 Basic Operations and Concepts
- Students demonstrate a sound understanding of the nature and operation of technology systems

NT.K-12.2 Social, Ethical, and Human issues
- Students understand the ethical, cultural, and societal issues related to technology

NT.K-12.3 Technology Productivity Tools
- Students use technology tools to enhance learning, increase productivity, and promote creativity

NT.K-12.5 Technology Research Tools
- Students use technology to locate, evaluate, and collect information from a variety of sources
- Students use technology tools to process data and report results

Understanding(s):	**Essential Question(s)**
Students will understand that: • Energy comes in different forms that we convert into usable forms • Energy sources are either renewable or non-renewable. • The various factors that influence energy usage decisions and the consequences of these decisions.	*Justice-oriented* What is the environmental footprint of each source of energy? What are the determining factors that determine how we use energy (cost, availability, effect of quality of life, etc)? How can we use healthier energy choices in our community? *Content-specific* What are our primary sources of energy?

	How do we convert energy into usable forms? What is the difference between renewable and nonrenewable energy sources? What are the advantages and disadvantages of each energy source?
Students will know: • Give real life examples of energy use • Identify primary energy forms (fossil fuels, nuclear, solar, and wind) • Contrast renewable (wind and solar) and non-renewable (coal, oil, natural gas, and uranium) energy sources • Explain how we convert energy sources into useable forms • Plan specific actions to save energy in real life situations	*Students will be able to:* Integrate their learning into a game play in which they create a city and make energy choices based on the growth and development of their city. They will then asked to articulate why they made certain decisions based on the knowledge they learned in class. Students will also look at their local community and make suggestions for energy efficiency, as well as answer how and why to make these changes.

Stage 2 – Assessment Evidence

Formative Assessments

Written quizzes, take home assignments such as "home energy audit", in class online research assignments and oral presentations on assignments.

Summative Assessment (Aligned to Justice-Oriented & Content-Specific EQs)

Students submit a written explanation describing the city they created and the energy decisions made. They will also write a letter to their city and state officials making suggestions for more efficient energy use and describe why they are making these recommendations. They will present their suggestions to the class before they are submitted to the officials.

Stage 3 – Learning Plan

Key readings/resources:

Lesson 1: Energy Introduction
The Harnessed Atom (student edition, teacher edition, and power point). Retrieved from http://energy.gov/ne/services/harnessed-atom

Lesson 2: Electricity
The Harnessed Atom (student edition, teacher edition, and power point). Retrieved from http://energy.gov/ne/services/harnessed-atom
How is electricity generated? [Lesson plan]. Retrieved from http://earthecho.org/educator-resources/how-is-electricity-generated-middle-school-lesson-plan

Lesson 3: Solar Energy
Solar energy and diversifying energy resources [Lesson plan]. Retrieved from http://education.nationalgeographic.com/education/activity/solar-energy-and-diversifying-energy-resources/?ar_a=1

Lesson 4: Wind Energy
Community wind project [Lesson plan]. Retrieved from
http://www.4-h.org/WorkArea/DownloadAsset.aspx?id=4227&libID=4222

Lesson 5: Fossil Fuels
The formation of fossil fuels [video]. Retrieved from
http://earththeoperatorsmanual.com/segment/3
Chocolate chip cookie mining [Lesson plan]. Retrieved from
http://www.greeneducationfoundation.org/institute/lesson-clearinghouse/download/file.html?fid=19.131
Evaluating natural gas [Lesson plan]. Retrieved from
http://education.nationalgeographic.com/education/activity/evaluating-natural-gas/?ar_a=1
Geography of oil drilling in the Gulf of Mexico [Lesson plan]. Retrieved from
http://education.nationalgeographic.com/education/activity/geography-oil-drilling-gulf-mexico/?ar_a=1
Car of the future [Lesson plan]. Retrieved from
http://www.pbs.org/wgbh/nova/education/activities/3507_car.html

Lesson 6: Nuclear Energy
Hakim, J. (2007). Fission vision. In *The story of science: Einstein adds a new dimension (pp.204-219)*. Washington, D.C.: Smithsonian Books.
The Harnessed Atom (student edition, teacher edition, and power point). Retrieved from
http://energy.gov/ne/services/harnessed-atom
Palliser, J. (2012). Green science: Nuclear energy. *Science Scope, 35* (1), 14-18.
http://static.nsta.org/files/ss1205_14.pdf
Nuclear reactors/energy generation. [Lesson plan]. Retrieved from
http://www.nrc.gov/reading-rm/basic-ref/teachers/unit3.html

Final Projects:
Plan It Green: The Big Switch [Interactive game]. Retrieved from http://www.planitgreenlive.com/
National Geographic Society (2013). Plan It Green: The Big Switch Educator Guide. Retrieved from http://education.nationalgeographic.com/education/media/plan-it-green-big-switch-educator-guide/?ar_a=1
The students will write a letter to city and state officials with energy efficiency suggestions, as well as answer how and why to make these changes.