

TGC Fellow Unit Template *

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School/Location: West Leyden High School/Northlake, IL

Subject: Chemistry

Grade: 10-11

Unit Title: Energy Crisis

Time Needed: 1-2 weeks

Unit Summary: Students will be learning about the law of conservation of energy and thermodynamics. They will expand this concept to investigate the global energy crisis, its origins and the conflict this creates between and within countries.

Stage 1 Desired Results

ESTABLISHED GOALS:

1) HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

2) HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability and aesthetics, as well as possible social, cultural and environmental impacts.

3) HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

4) HS-PS3-4: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

5) HS-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).

6) [CCSS.ELA-LITERACY.W.11-12.2](#)

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

7) [CCSS.ELA-LITERACY.W.11-12.6](#)

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Transfer

1. Recognize perspectives by using various global sources to gather information
2. Communicate what is learned to a diverse audience
3. Utilize information collected to form a path of action that may help mitigate the issue
4. Use technology to organize information and present it to an audience in an engaging manner
5. Use technology to obtain various sources and critically determine which sources are relevant and reliable

Meaning

UNDERSTANDINGS

Students will understand that...

1. Countries vary in their energy usage, the form of energy they utilize and the availability of energy to individuals in that country
2. Although energy cannot be created or destroyed, the amount of usable energy on earth is limited
3. The role of energy in economics, politics and quality of life worldwide
4. There is a current global energy crisis and it influences our lives via economic, environmental and political avenues

ESSENTIAL QUESTIONS

1. What are some common energy issues seen around the world?
2. How is energy transferred from one form to another?
3. What is "clean" energy?
4. How do limited energy resources affect global economics and politics?
5. How is climate change affected by energy consumption?

| | Acquisition | |
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| <p>8) CCSS.ELA-LITERACY.W.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p> <p>9) CCSS.ELA-LITERACY.W.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.)</p> <p>10) CCSS.MATH.CONTENT.HSS.IC.B.6 Evaluate reports based on data.</p> <p>11) IL State Goal 18 For Social Sciences 18.B.5 Use methods of social science inquiry (pose questions, collect and analyze data, make and support conclusions with evidence, report findings) to study the development and functions of social systems and report conclusions to a larger audience.</p> <p>12) IL State Goal 14 For Social Sciences 14.D.5 Interpret a variety of public policies and issues from the perspectives of different individuals and groups</p> <p>13) IL State Math Goal 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.</p> <p>GLOBAL COMPETENCIES: Communicate Ideas Recognize perspectives Use global issues to investigate the world</p> <p>RESOURCES: http://www.onlinenewspapers.com</p> | <p><i>Students will know... (Content)</i></p> <ol style="list-style-type: none"> 1. Energy cannot be created or destroyed just transferred 2. Which countries use the most amount of the world's energy 3. The sources of the usable energy in the world 4. The cost of energy in various countries 5. The correlation between the energy crisis and international conflicts | <p><i>Students will be able to... (Skills)</i></p> <ol style="list-style-type: none"> 1. Analyze energy issues and what countries are doing to solve their energy crisis problems 2. Compare/contrast various energy supply chains and their economic values 3. Research and build knowledge about our energy sources and those used around the world 4. Produce and present a 10-15 minute presentation to an audience and be able to answer questions 5. Offer some solutions to the energy shortage, discuss various forms of alternate energy 6. Understand and convey the significance of the role of energy in global politics and economics |

http://www.iaea.org/Publications/Magazines/Bulletin/Bull501/Energy_Crisis.html
<http://energy.alltop.com>

Stage 2 - Evidence

| Assessment | Evaluation Criteria (Learning Target or Student Will Be Able To) |
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| <p>Assessments FOR Learning: (ex: kwl chart, exit ticket, observation, draft, rehearsal)</p> <ol style="list-style-type: none"> 1. Exit tickets on conservation of energy 2. Formal assessments of calorimetry calculations 3. Informal teacher/group meeting (check-ins) <ol style="list-style-type: none"> a) Review of information gathered b) Utilization of technology c) Analysis of sources d) Questions generated e) Solutions investigated f) Progress of presentation 4. Online homework 5. Observation of students working collaboratively in group work | <ol style="list-style-type: none"> 1. The ability to calculate calorimetry problems and perform algebra to solve for multiple variables within the equation 2. The degree to which the assignments are accurately completed in a timely fashion and to which students work collaboratively throughout the unit 3. During check-ins, each individual in the group should be able to answer/pose questions, hold an intelligent conversation regarding the chosen topic, show progress in the various aspects of the rubric, research & presentation, and the group should be working together to create the best learning environment for their peers as possible. |
| <p>Assessment OF Learning: (ex: performance task, project, final paper)</p> <ol style="list-style-type: none"> 1. Presentation of energy article (individual) 2. Presentation of final project (group) 3. Carry out experiment in which energy flow between objects is observed. Analysis of data from this experiment. Explanation of how this relates to the law of conservation of energy. | <ol style="list-style-type: none"> 1. The degree to which the article presentation represents the issue of energy crisis in a particular area and the understanding of the student of other people's perspective 2. A detailed rubric will be used to evaluate the final project. It will include the following: <ul style="list-style-type: none"> • Utilization of a variety of international & domestic sources • Selection and use of appropriate media with which to present and communicate findings to a wide array of audiences • Ability to assess options, plan actions & design solutions based on scientific evidence & potential impact • The ability to convey information regarding costs of energy and alternative sources of energy globally 3. The ability to conduct an experiment that demonstrates the law of conservation of energy and analyze the results to show proof of the law |

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction (Make this a useful outline or summary of your unit, your daily lesson plans will be separate)

Day 1: Students will be introduced to types of energy via a bell work question for which they will use their Chromebooks. A discussion will follow during which the law of conservation of energy will be explained. A demo on the flow of energy will follow and the students will experience first hand that energy flows from high temperatures to low that temperature is a relative term. (G4, K1)

Day 2: Students will learn about the different units used when quantifying energy and how to convert between them. They will recognize the difference between a calorie (used internationally) and a food calorie (used in America). Students will explore endo/exothermic reactions by performing a hands on demo and recording observations. A class discussion of the demo will follow. (G13)

Day 3: Students will be given a picture of a bomb calorimeter and using only this visual, they will try to come up with the purpose and function of this machine. A class discussion will be held and we will piece together how a calorimeter works and what it is used for. Students will begin calorimetry problems. (G5, G7, G13, T2, U2)

Day 4: Calorimetry Lab-students will perform a laboratory experiment during which they will attempt to calculate the calories per gram of a particular food item. (K1, G13)

Day 5: Students will practice calorimetry problems and we will review of the lab as a class. Students will compare their final number for calories per gram to others in the class. (G13)

Day 6: Bell work practice of calorimetry. Students will find one article on any aspect of the energy crisis in occurring in the world. Each student will choose a different article. A rubric detailing what is expected in the short presentation will be handed out. (G8, G9, G11, G13, S1, S3, U1, U4, T1, T2, T4, T5)

Day 7: More thermochemistry practice and individual work time for article presentation. Individual check-ins with teacher (G8, G9, G11, G13, S1, S3, U1, U4, T1, T2, T4, T5)

Day 8 & 9: Individual Presentations (G7, G8, G9, T2, T4, U1, U3, U4, K4, K5, S1)

Day 10: Intro to energy project and group assignments First teacher/group meeting to discuss general criteria, focus and direction of research & presentation.

Day 11-12: Work time and teacher check-ins (G1, G2, G3, G5, G6, G7, G8, G9, G10, G11, G12, T1, T3, T4, T5, U1, U3, U4, K1-K5, S1-S6)

Day 13-14: Group Presentations (G6, G7, G8, G9, G10, T2, T4, S2 S4, S5, S6)

**adapted from Understanding by Design Model*

TGC FELLOWS UBD Lesson Template

Lesson Title: Introduction to the global energy crisis Subject: Chemistry Prepared by: Hina Patel

Materials Needed: Computers/Internet

Global Competency: Recognizing other people's perspectives, Investigating the world and communicating ideas

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| Where is the lesson going? (Learning Target or SWBAT) | I can recognize that various regions of the world suffer with energy shortage problems. I can gather information, understand the social and political issues in this region and generate a short but informative presentation for my peers. |
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| Hook: | Tailored Differentiation: |
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The room should be pitch black with only a candle lit as the kids walk in. Explain to them that for thousands of children around the world, this is a normal occurrence in their lives due to a global energy shortage.

The students will be asked to find an article online that highlights the energy crisis in some area of the world. Each student will need his/her own article.

Students should take notes on the article and have questions prepared with the teacher walks by.

If an article is too difficult, they should consult with the teacher about its meaning and look up references for more meaningful understanding.

Students should highlight all vocabulary words that are not known.

Equip:

Each student will need a computer with internet access and some presentation software or app (Glogster, Prezi, etc).

The presentation should only have words that will easily be understood by their peers and include a map showcasing the region of the world he/she is talking about.

Rethink and revise:

A rubric will be given for the presentation and the teacher will make sure to check in with each student for a brief discussion on what his/her plans are as far as presenting the information from the article in an organized, concise manner. This will allow the kids to edit their work before the final presentation and ask any questions about the article they may have.

Evaluate:

The teacher will evaluate the student using the rubric provided at the beginning of the lesson. Each student will also get 2-3 peer reviews.

Notes: Depending on class size this lesson may take multiple days to not only present but also for the teacher to meet with each student.

Organization:

Have as many legitimate websites that the students can use to find an article ready before the students arrive.

