Activity: Nuclear Energy Debate

Summary
In this activity, students will explore the content of nuclear energy in a deeper, meaningful way, and they will also gain practice creating a claim and backing it up with evidence.

Grade Level
High school

NGSS Alignment
This activity will help prepare your students to meet the performance expectations in the following standards:
- **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.
- **Scientific and Engineering Practices:**
  - Engaging in Argument from Evidence
  - Obtaining, Evaluating, and Communicating Information

Objectives
By the end of this activity, students should be able to
- Identify the pros and cons of using nuclear power as an energy source.
- Make a conclusion supported by scientific evidence.

Chemistry Topics
This lesson supports students’ understanding of
- Pros and cons of nuclear power

Time
**Teacher Preparation:** 5 minutes
**Lesson:** 60–120 minutes

Materials
- Video equipment
- Internet access

Safety
No safety precautions need to be observed for this activity.

Teacher Notes
- This lesson falls towards the end of a unit on nuclear energy. Prior to the lesson, students have learned what nuclear chemistry is and are able to differentiate between natural and artificial transmutation. They have also learned about fission and fusion and how these two processes can be used to create energy.
- The Ted Talk: [http://www.ted.com/talks/debate_does_the_world_need_nuclear_energy](http://www.ted.com/talks/debate_does_the_world_need_nuclear_energy)
- Pause the video at 21:30. Students will work individually to respond to the question “Do you think the U.S. should continue to develop nuclear power plants? Why or why not?” Once all students have written their own answer, several students will share their position and explain why they came to their conclusion. Then press play so students can watch the last few minutes of the debate.
- This activity can be completed either in class with additional support from the teacher, or at home as homework.
• Formative evaluation: As students are writing their initial response to the question “Do you think the U.S. should continue to develop nuclear power plants? Why or why not?” the teacher will circulate to make sure that every student is able to come up with an initial conclusion. Additionally, as students are researching, the teacher will circulate and check in with individual groups to make sure that all students are able to use evidence to support their conclusion.

• Summative evaluation: Students’ position essays on nuclear energy will serve as a summative evaluation. They will be evaluated on both their demonstration that they understand the chemistry content and their ability to formulate a claim and use evidence to back it up.

FOR THE STUDENT

Student Activity Sheet: Does the World Need Nuclear Energy?

Lesson
While watching the TED debate between Stewart Brand and Mark Jacobson, take notes on the arguments for and against nuclear energy.

| Arguments for Nuclear Energy | Arguments Against Nuclear Energy |

Do you think the U.S. should continue to develop nuclear power plants? Why or why not?

Find a partner who has the same position as you. Use the following resources to find evidence to support your conclusions.

• http://www.nytimes.com/2011/03/14/science/earth/14politics.html
• http://www.nytimes.com/2014/05/02/opinion/the-right-lessons-from-chernobyl.html
• http://www.discovery.com/tv-shows/curiosity/topics/10-pros-cons-nuclear-power.htm
• http://education.nationalgeographic.com/education/encyclopedia/nuclear-energy/?ar_a=1

Evidence:

• ________________________________________________________________________________________________
• ________________________________________________________________________________________________

Source: ____________________________________________________________________________________________

• ________________________________________________________________________________________________
• ________________________________________________________________________________________________
Write a one to two page response to the following question. Should the U.S. continue to develop nuclear energy? Why or why not? Cite evidence from the video and additional readings. Your response should include an explanation of the chemistry behind nuclear energy.

**CONNECTIONS TO STANDARDS**

**New York State Core Curriculum:**
Standard 1 S2.2 - Refine research ideas through library investigations, including information retrieval and reviews of the literature, and through peer feedback obtained from review and discussion.

Standard 7 1.1 - Analyze science/technology/society problems and issues on a community, national, or global scale and plan and carry out a remedial course of action.

Standard 4 4.4 - Explain the benefits and risks of radioactivity.

**NYS Common Core:**

**Reading:**
1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
10. Read and comprehend complex literary and informational texts independently and proficiently.

**Writing:**
1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.