**Lesson 2 Types of Energy and Environmental Stewards**

**Problem statement:** How can we provide energy to a growing population in Snohomish County and still be good stewards towards the environment?

This lesson will introduce what it means to be a good steward to the environment while siphoning resources from the Earth to provide energy for the growing population. Students will be provided some background info on options cities can choose to produce power. This instructional time will be short to allow time for students to explore and research their assigned energy source.

**Learning objectives:** Students will use several resources provided by the presentation to gather relevant information to fill out their graphic organizer.

**Lesson standards (NGSS, CCSS, CTE):**

NGSS:

* (MS-LS2-4): Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
* (4-ESS3-1): Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

CCSS for English Language Arts:

* [CCSS.ELA-LITERACY.WHST.6-8.2.B](http://www.corestandards.org/ELA-Literacy/WHST/6-8/2/b/) Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
* [CCSS.ELA-LITERACY.W.6.7](http://www.corestandards.org/ELA-Literacy/W/6/7/) Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
* [CCSS.ELA-LITERACY.W.6.8](http://www.corestandards.org/ELA-Literacy/W/6/8/) Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

**Soft skills:**

* Collaboration:Students will work in small groups to research their newly assigned energy source. Having conversations with peers about sources, information, data, facts, examples will help them determine what is essential to know and utilize when they make decisions for creating their final proposal.
* Communication: Students will be assigning responsibilities/tasks to group members. Students will share their individual findings back to their team.

**Connections to career and educational pathways:**

* Data and information gathering before major decisions that impact the lives of many are modeled in this activity
* Being assigned roles within a group is commonplace in any career or educational pathway

**Materials:**

* Warmup/Hook activity:
  + Poster
  + Post-its
* Graphic organizers for note taking
  + Graphic Organizer Individual/Role (1 per student)
  + Data Collection Worksheet (1 per group)
* Computers connected to the internet for accessing slides and researching types of energy.

**Lesson preparation:**

* Print out
  + Graphic Organizer Individual/Role (1 per student)
  + Data Collection Worksheet (1 per group)
* Determine which group will be assigned which energy type
* Write out the question for the poster (“What do you think Environmental Stewardship is?”).

**Time required:** One class period 50-55 minutes

**Grouping of students for instruction:** Students are continuing to work with the group that was established in Lesson One.

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| Direct Instruction: have students sit with their group. Teacher will have the group energy assignments and where they are sitting written on the board. Teacher will also explain that from this moment on their groups are acting as research groups for their own energy type for the county. Groups will be presenting their plans that show the most efficient and environmentally-conscious design to council (their instructor). The rubric will be introduced on day 3.  Hook:/warm up (Access prior knowledge):  Instructions posted on board/screen. Teacher  directs students to instructions and to the question they are answering: “What do you think Environmental Stewardship is?” | Students will find their assigned seats with their group  Hook:  Students have 3-5 minutes to brainstorm with their team their own definitions for environmental stewardship, to develop collaborative definitions with their team and write it on a post-it. One student from each group will share definitions. Add post-its to the poster. |
| Class Discussion:  Facilitate discussion on what each team believes Environment Stewardship based on their post-it note. This definition will later be written on the whiteboard or on a poster and displayed on the wall. | Class Discussion:  Students will build off of the group's definition to create a common understanding and a definition that will be used for the whole class. |
| Direct Instruction: Teacher shares the meaning of Environmental Stewardship and uses slides 1-3 to introduce Environmental Stewardship and to play videos that are linked on the slides.  Teacher will briefly instruct students that energy comes from natural resources, that they must be converted through transformers and generators into electricity before going out to homes.  Teacher will go through the energy slides and briefly explain each type of energy and show that additional research materials are linked for each group on each slide. Teacher will show students how to access the slides. | Direct Instruction: Students will listen to the teacher's instruction through the slides, and watch the video as it is presented by the teacher. Students may keep individual notes if they so wish.  Students will listen to the teacher as they go through the slides, keeping individual notes if they wish. Students will watch videos on the links about energy individually depending on available technology. |
| Teacher will provide time for teams to research | Collaborative Research: Students will divide up research topics amongst the group: costs, environmental impacts, benefits of this option, and disadvantages of this option.  Each student is responsible to fill in their Graphic Org-Individual Role, and then bring that data back to their team so they can complete their group’s Data Collection Worksheet. The information can be found through the slides or additional personal research. |
| Exit Ticket:  Teacher will have students turn in graphic organizers for a quick check-off and to determine if students need additional support.  Graphic organizers will be returned the following day for student use. | Exit Ticket:  Students will turn in individual graphic organizers to show and share with the teacher their notes and contribution to the team's discussion. |

**Accommodations:**

* Visual cues and instructions-notes on board so students don’t just “hear” my instructions
* Use of amplification system
* Link to slides will be given to students so they can go over the document at their own pace
* Students who are ELL will be taught skills to translate websites and documents to read in 1st language.

**Extensions:**

* If time students could create posters for what their group this stewardship looks like in an ideal world. They do this in a t-chart giving examples of what good stewardship looks like and does not look like.

**Assessment:**

Formative Assessment in the Lessons

* Teacher will lead discussion on stewardship and access student understanding of this concept formatively.

**References/Resources:**

* For information used on Slide 3

[*https://en.wikipedia.org/wiki/World\_energy\_consumption*](https://en.wikipedia.org/wiki/World_energy_consumption)

<https://ecology.wa.gov/About-us/How-we-operate/Environmental-stewardship>

<https://en.wikipedia.org/wiki/Environmental_stewardship>

<https://www.youtube.com/watch?v=9FpL2UghXIg>

<https://www.youtube.com/watch?v=8ogn1t_wLiQ&feature=emb_title>

* + <https://blog.ucsusa.org/mark-specht/clean-electricity-in-washington-state>
* For images and information shared on the slides

<https://www.nytimes.com/interactive/2017/02/10/nyregion/how-new-york-city-gets-its-electricity-power-grid.html><https://www.instituteforenergyresearch.org/states/washington/>

* Info used for Solar energy:
  + <https://www.energysage.com/solar-panels/solar-panel-cost/wa/>
  + <https://www.youtube.com/watch?v=4FaPjX4rBzM>
  + <https://www.energy.gov/science-innovation/energy-sources/renewable-energy/solar>
* Info used for Wind:
  + <https://www.energy.gov/eere/wind/frequently-asked-questions-about-wind-energy>
  + <https://www.irena.org/documentdownloads/publications/re_technologies_cost_analysis-wind_power.pdf>
* Info use for hydropower:
  + <https://www.irena.org/documentdownloads/publications/re_technologies_cost_analysis-hydropower.pdf>
  + <https://www.hydro.org/waterpower/why-hydro/affordable/>
  + <http://www.wvic.com/content/facts_about_hydropower.cfm>
* Info used for nuclear:
  + <https://www.world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx>
  + <https://www.eia.gov/nuclear/>
* Info used for Natural Gas:
  + <https://www.eia.gov/energyexplained/natural-gas/>
* Info used for petroleum:
  + <https://www.eia.gov/petroleum/>
* Info used for coal:
  + <https://www.eia.gov/coal/>
* Link to additional resources used as additional resources on the slideshow:
  + <https://www.eia.gov/tools/faqs/faq.php?id=487&t=3>
  + <https://www.e-education.psu.edu/eme801/node/530>
  + <https://www.youtube.com/watch?v=wMOpMka6PJI>
  + <https://www.youtube.com/watch?v=zvpov69RzoQ>
  + <https://www.youtube.com/watch?v=RnvCbquYeIM>
* Use one graphic organizer for each student per team, to use for gathering research while learning about team’s assigned energy source created by Erin Duffy.
  + [Graphic Org-Individual Rol](https://docs.google.com/document/d/11WOHK9iOZaf5S_MR0mfJdKA4bgre-ApNv9W6MeWFeWo/edit?usp=sharing)e
* This graphic organizer above is to be used in each lesson when students are expected to take notes in their assigned/chosen role.
  + [Data Collection Worksheet](https://docs.google.com/document/d/1d6ayQCHDLxzJfhMGQOOPlhvr74U-Lipy4mAWxCm3PR4/edit?usp=sharing)