**SNC1W Resource Collection**

**Title:** Cost of Electricity and Connection to Society

**Course Code:** SNC 1W

| **Topics**  Cost of Electricity  Social Impacts and access to electricity | **Timing** Preparation: 10-15 min (to review) Lesson: 60 min (plus additional class time to work on task) |
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**Curriculum Expectations:**

A2.3 analyse how the development and application of science is economically, culturally, and socially contextualized, by investigating real-world issues

A2.4 apply scientific literacy skills when investigating social and environmental issues that have personal, local, and/or global impacts

D1.1 assess social, environmental, and economic benefits and challenges resulting from the production of electrical energy from various sources

D1.2 evaluate how electrical energy production and consumption impact various communities locally or globally, and describe ways to achieve sustainable practices

D2.8 determine the efficiency of various electrical devices that consume or produce electrical energy, and identify the energy transformations in each device

**Introduction:**

To understand efficiency and consumption, students need to have an understanding of the cost and price of electricity. Once this topic is reviewed, and relevant examples completed, students can be assessed through a consolidation activity that involves designing, research, and critical analysis.

Students are tasked with designing a schematic circuit diagram of a dorm room given a set of requirements. Following this, students calculate the cost of running appliances that may be used in their dorm room. As a final part, students will use an online mapping tool to select a community in Ontario that has a higher than average home energy burden and analyse potential reasons.

The design, cost calculations, and analysis can be presented in a variety of formats chosen by the student while following a provided detailed rubric.

**Learning Goals:**

* To demonstrate an understanding, through the application of series and parallel circuits.
* To design using established conventions and symbols a combination of series and parallel circuits.
* To understand the everyday applications of electric efficiency through calculating the cost of small appliances.
* Identify and analyse how electrical consumption impacts various local communities (Energy Poverty).

**Prior Knowledge:**

Students may need to review the following concepts:

* Electrical circuit diagrams and symbols
  + Wires, source of electricity, switches, loads, flow of electricity
* Series and Parallel circuit diagrams
* Calculating the cost of electricity

**Lesson Plan**

| **Description** | **Time** |
| --- | --- |
| Introduction | |
| Video introduction, followed by a large class discussion to analyse the difference between Alternating and Direct Current. Small and large group discussions will contextualize the assigned task.  (Note, the attached video can be stopped when the discussion of electrical frequency begins)  A teacher-led, student-generated summary of Alternating and Direct Current is created as a class (large group discussion) | 20 minutes |
| Content | |
| Cost of Electricity:  To understand electrical efficiency, it is important to understand how much electricity costs.  A brief, teacher-led example of how electricity is calculated (kW) and Kilowatt-hours is explained.  Time of Use Pricing for electricity is explained and an example is reviewed with the class.  Relevant Example:  The ubiquity of cell phones makes the following class activity relevant to students. Another small appliance can be used instead of a cell phone if class demographics and equity considerations need to be made. | 25 to 30 minutes |
| Consolidation | |
| This consolidating task can serve as a unit task evaluation or summative project.  Part 1:  Design a dorm room electrical circuit diagram that meets a given set of expectations.  Part 2:  a) Calculate the cost of electricity for several small appliances.  b) Use an energy poverty map to analyse and research various groups in Ontario that have a high home burden in accessing electricity. Students will research why the community they chose may have a higher burden of electricity.  Present both Part 1 and 2 in a manner chosen by students, given a detailed rubric. | Introduction and Review of Task:  10 to 15 minutes  Class time should be given to students to work on this consolidation activity.  **A full period or more can be assigned.** |

| **Materials:**   * Computers/Tablets * Laptop/LCD Projector * Handouts: Electricity Unit Task Appliance Template * Other: | **Transferable Skills**   * Critical thinking and problem solving * Innovation, creativity, and entrepreneurship * Self-directed learning * Collaboration * Communication * Global citizenship and sustainability * Connecting social issues to science |
| --- | --- |
| **Instructional Strategies**   * Brainstorming * Think Pair Share * Demonstration * Group Work * Independent Work * Questioning * Class Discussion * Hands On Activity * Other: Student generated summary | **Assessment For/As/Of Learning**   * Conversation * Observation * Homework Check * Notebook Check * Participation * Peer Assessment * Self Assessment * Product(see attached rubric and instructions) * Other: |

**Instructional Resources:**

* Slide decks: 1) “Cost of Electricity” and 2) "Electricity Task”

**Assessment Resources:**

* Checklist: “Consolidation Task Checklist”
* Peer Assessment and Scaffolding of Student Work: “Electricity Unit Work and Peer Assessment”
* Rubric: “Electricity Unit Task Rubric”
* Complimentary Teacher Feedback sheet or alternative to the rubric: “Task Evaluation Sheet”

**Safety**

* No safety considerations

**Equity and Diversity Concerns:**

* **The video** suggested does not show a person (other than a hand), which may help to make it more accessible to all.
* The example of the cell phone calculation of cost may not be appropriate depending on the individual needs of the class. Consideration may be given to replacing this with another common appliance such as a fridge or toaster.
* Energy Poverty aligns with Strand A of the SNC1W curriculum however it is a topic that can be sensitive. Becoming familiar and comfortable with this topic will allow an educator to approach this topic with more confidence.

**Teaching Suggestions/Hints**

* Become familiar with the Energy Poverty Mapping Tool to understand how to read it before showing it to the class.
* Stop playing the AC/DC video about 3 minutes into the video as it begins to discuss topics not related to curriculum (frequency, etc.)
* The Rubric is a detailed summary of expectations for the evaluation of the task. Students and teachers should focus on the success criteria. An evaluation sheet is also included which can be used to compliment the rubric or can be used instead of the rubric.

**Next Steps/Extensions**

* Students can be encouraged to research various diverse pathways and education institutions as they relate to electricity. These can be shared with the class. This task would relate to the consolidation task of building a combined circuit for a dorm room while connecting to the given strand.

**Additional Resources**

* <https://energypoverty.ca/mappingtool/>
* <https://www.enbridge.com/energy-matters/energy-school/what-is-energy-poverty>
* https://energypoverty.ca/