**Lessons 1 & 2: Renewable vs. Non-renewable / Renewable Energy 101**

**Problem Statement:** The problem is the PUD needs to invest money into alternative energy sources and needs suggestions for the future. This lesson ties into the problem because students must understand what options are going to be available in future years.

**Learning Objectives:**

Be able to identify renewable sources of energy vs. non-renewable sources.

Be able to express the justification for seeking renewable energy resources.

Be able to explain any of the 11 renewable energy sources presented, at least in summary, if not detail.

**Materials:**

1. Physical representations *or* pictures of:

coal, crops, timber, clean fresh water, wind, sun, flowing rivers, waves, uranium

1. Renewable vs. Non-Renewable notes.doc
2. Energy 101.ppt
3. Renewable Energy 101.doc

**Lesson Prep:**

Review the WS’s and notes provided below for students.

What questions can you ask to bring this topic to their life situation?

For example: Is your community farming, fishing, or logging based?  Where does your state’s electricity come from?  What do they think of the Keystone Pipeline proposal?  Will we ever run out of oil?  What is the future of electricity generation?

**Time Required**:

2-3    50 minute class periods

**Grouping of students for instruction**:

Whole class for Renewable vs. Non-renewable discussion and notes given

Groups of 2-3 students moving around to stations which have the information they seek

**Procedure:**

Renewable vs. Non-renewable:

Place interesting items out for display as students enter class. Ex: lump of coal, small windmill, a dead fish or evergreen branch, chunk of 2x4 lumber, canister with a radioactive logo on it, jug of oil, picture of a sunny day, picture of a large wave.  Ask students to make observations about what they see.  After some discussion about what they notice, guide them to categorize these items.  Use questions and their observations to lead them to understand that these items represent renewable and non-renewable resources.  Ask them to help you group them into these categories. Be sure to discuss things like clean fresh water and the Ogallala aquifer in the “breadbasket” of the United States.

Renewable Energy 101

This activity can be student led with more time and research.  However, as a quick overview of 11 different renewable energy sources to begin their decisions on what to suggest to the PUD, this version is abbreviated.  Students are in their groups of 2-3 students and each have a copy of the handout “Renewable Energy 101” to take notes on.  Place one energy source at a station, forming 11 stations around the room. As they go from station to station learning about how each energy source generates electricity and the advantages/disadvantages of each, they may have questions.  Be sure to roam and ask groups at random to explain to you how an energy source creates electricity, what is good about it, and what is bad about it without looking at their sheets.  If they are aware you will be doing this and assigning points based on their answers, they may ask more questions and/or take this simple activity more seriously.  This is also a good opportunity to allow students to teach other students if they are assigned these sources ahead of time to research as homework.  After students are given sufficient time to take their own notes, go over the notes with them, asking for students to explain their understanding of how each source produces electricity.  Take this opportunity to see what they think of this source for the future, how it could be used, etc.  What questions do they have?  Clear up any misconceptions, such as solar panels not being an option in Western Washington or on a cloudy day.  At this time, be sure to reinforce how energy is going to be transferred through their system and highlight that they will be explaining the transfers in their system as part of their presentation. This would also be a good time to briefly explain how the power grid works since that is a prime example of energy transfers and they may be lacking that background information.

**Assessment**: As students leave, have them fill out an “exit ticket” on scratch paper that lists 2 things they learned today and one question they have.  This should help guide your instruction for the next day.

**Accommodations**: A copy of the notes “Renewable vs. Non-Renewable Resources” and the KEY for Renewable Energy 101 could be provided (or parts of them) to assist students who may have a hard time processing as quickly or writing while listening.

**Extensions**: Research can be conducted instead of stations and students can teach about each energy source in groups.  This takes a couple more days typically unless information is gathered and filtered for them ahead of time.  However, this allows students practice presenting information to their peers and communicating clearly.

**References** /**Resources**:

Depending on time, a YouTube playlist could be generated that contained these 11 sources of renewable energy for help with visually explaining these topics.