From Forest to Fuels Energy Unit
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Before the unit begins: Have the students complete the survey of Past and Present Energy Use worksheet. – MEECS Energy Unit Lesson #1

Day 1
Learning objective- The learner will be able to identify how people in Michigan use energy and compare energy use through the generations of their families.

1- Who do we use Energy in Michigan
   Brain storm ways we use energy in Michigan. List the students responses on the board and discuss

2- Michigan and United States Total Energy Consumption by Sector Overhead
   MEECS Energy Unit Lesson #1. As a whole group, discuss the over head

3- How has Consumption of energy changed since your grandparents were children?
   Break the students up into groups of FOUR. Discuss the energy use surveys in their learning groups. Students will answer the following questions:
   *How have the common fuels used for cooking, drying clothes, and heating changed?
   *How have the number and typed of appliances changed?
   *What kinds of transportation, energy sources or tools did your parents or grand parents use that you do not have or use?

   Once discussed in their learning groups the student share with the whole group, common ideas are written on the board and discussed.

Day 2
Learning objective- The learner will be able to categorize energy resources as renewable or non-renewable.

1- What is the difference between renewable and non-renewable energy resources?
   Discuss what is defined as a renewable resource and what is a non-renewable energy resource.

2- Divide up the class into groups of four students. Give each group a set of picture cards. Energy cards can be found in MEECS Energy Binder Lesson 2. Students divide the cards up into two groups: non-renewable and renewable energy resources. Discuss as a whole class. Introduce Non-Renewable Energy choices.

3- Non-Renewable Energy Choices and Impacts
   Back in their learning groups, have the students now take a look at specifically Non-Renewable Resources using the cards from MEECS Energy Binder Lesson 4 Students read the Non-Renewable Energy Cards in their groups and while reading and discussing fill out the Energy Resource Summary chart.
Day 3
Learning objective- The learner will use technology to study non-renewable energy resources looking at the advantages and disadvantages.
In the computer lab using the Tech Alive Learning Module, students will use the Using oil, gas and coal in our Lifetime Michigan Technology University Web Module. Students will learn about the three most used non-renewable energy resources using the on-line interactive web activity.

http://techalivemtu.edu/meec_index.htm

Day 4
Learning objective- The learner will describe the advantages and disadvantages of renewable energy resources and evaluate Michigan’s renewable energy potential.

1- Renewable Energy Choices and Impacts
   Back in their learning groups, the students now take a look at specific Renewable Resources using the cards from MEECS Energy Binder Lesson 5. Students read the Renewable Energy Cards in their groups and while reading and discussing fill out the Energy Resource Summary chart

2- Discuss in a large group the different types of Renewable Energy sources.

3- On the board create a compare and contrast table discuss as whole group the similarities and differences between renewable and non-renewable energy resources.

Day 5 and Day 6
Learning objective- The learner will create an informational publication utilizing their knowledge of renewable resources.

Assign students to create a brochure using Microsoft Publisher summarizing the advantages and disadvantages of using renewable energy resources.

Day 7
Learning objective- The learner will describe Biomass as an alternative renewable energy source and evaluate Michigan’s energy potential.

1- Introduce Biomass as an alternative renewable energy source that is a hot topic in Michigan.
2- Using a power point, discuss the different kinds of biomass with examples and facts about each type.
3- Students take notes by filling out a biomass information chart.
Day 8
Learning objective- The learner will use their knowledge of biomass to play a quiz game.

Students use their note sheet from Day 7 to play a board game called Biomass Bonanza. In this game student earn energy credits by answering questions about biomass energy.

Day 9
Learning objective- The learner will compare and contrast the advantages of and disadvantages of biomass as an alternative energy option.
1- Renewable Energy from Forest Resources. Using the power point supplied by Chris Webster of MTU, students will take notes on the Promise and Perils of Bioenergy.
2- What does carbon have to do with Biodiversity?
   Students prepare to do an outdoor biodiversity assessment of trees in the school forest. Select teams of four students and go over the lab procedure for Day 10.
3- Students will be given an 8 by 8 meter plot. Mark off plots ahead of time using orange field tape.
   Measure the diameter of the trees at breast height (4.5ft) Trees need to have a diameter of greater than 7.5 to be counted.
   Measure the height of each tree that has a recorded diameter.
   Using a tree ID key ID each tree measured in the area.
   Calculate the percent carbon (using Anne Muto’s unit worksheet)

Day 10
Learning objective- The learner will calculate the carbon output of trees and identify the tree species in the school forest.

In the field students complete the lab activity following the procedure discussed on Day 9.
Discuss results as a large group after the activity

Day 11
Learning objective- The learner will demonstrate how chemical reactions release energy to produce ethanol and evaluate the usefulness of the production process.

1- Biofuels: Investigating Ethanol production
   Using the Lab-aids kit students will investigate the chemical reactions that release energy.
2- Divide the students into groups of four. Students follow the lab procedure to demonstrate the fermentation of corn and cane sugar, which are two food sources most used to produce ethanol.
3- Discuss the results of the lab activity as a whole group
Day 12
Learning objective- The learner will ecological footprint calculators to assess and compare their impact on the environment to that of their classmates.

1- What is your Ecological Footprint
   Using the computer lab and internet, students will calculate their carbon footprint on the myfootprint.org web site.
   While using the site, students will fill out the worksheet in the MEECS Energy Binder Lesson 8.

2- Discuss the carbon footprint as a group and assess the similarities and differences between student results.

3- Students create action plans to help reduce their carbon footprint. Using the record sheet in the MEECS Energy Unit Lesson 8.