Senior High School

Physical Science

Quarter 1 – Module 7:
Energy Sources

ALTERNATIVE DELIVERY MODE

ADM

Physical Science – Grade 11
Alternative Delivery Mode
Quarter 1 – Module 7: Energy Sources
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DepED
DEPARTMENT OF EDUCATION

Introductory Message

For the facilitator:

Welcome to the Physical Science – Grade 11 Alternative Delivery Mode (ADM) Module on Energy Sources!

This module was collaboratively designed, developed, and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:

Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

As a facilitator you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the Physical Science – Grade 11 Alternative Delivery Mode (ADM) Module on Energy Sources!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 ***What I Need to Know***	This will give you an idea of the skills or competencies you are expected to learn in the module.
 ***What I Know***	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
 ***What's In***	This is a brief drill or review to help you link the current lesson with the previous one.
 ***What's New***	In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity or a situation.
 ***What is It***	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 ***What's More***	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.

 ***What I Have Learned***	This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.
 ***What I Can Do***	This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.
 ***Assessment***	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
 ***Additional Activities***	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.
 ***Answer Key***	This contains answers to all activities in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

What I Need to Know

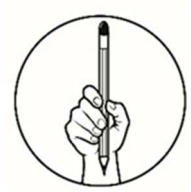
In our everyday lives, it would almost not be possible to accomplish tasks without spending an amount of energy. Have you run a tricycle or any vehicle before? How did it work? While watching television, have you wondered what powers it on? These all work because of energy! You can continue learning more about energy sources using this module. So, continue reading!

At the end of this module, you are expected to:

1. Describe how energy is harnessed from different sources: (a) fossil fuels, (b) biogas, (c) geothermal, (d) hydrothermal, (e) batteries, (f) solar cells, and (g) biomass. (S11/12PS-IIIf-h-25)

2. Identify the advantages and disadvantages of each energy sources (S11/12PS-IIIf-h-25)

3. Express awareness on the conservation of our energy sources (S11/12-PS-IIIf-h-25)



What I Know

Direction: Read and analyze the following questions. Write the letter of the correct answer on your answer sheet.

1. Which source of energy is obtained from animal manure that produces methane needed to generate heat and electricity?
   a. geothermal
   b. hydrothermal
   c. biomass
   d. biogas
2. Which is not an advantage of using Geothermal energy?
   a. inexpensive
   b. clean
   c. environment-friendly
   d. sustainable
3. What do you call the gas mixture produced by biogas when bacteria decompose the manure?
   a. methane
   b. hexane
   c. CO_2
   d. LPG
4. Which converts electricity from chemical potential energy for storage and back into electrical energy?
   a. batteries
   b. solar cells
   c. dams
   d. geothermal
5. What is the main problem in using fossil fuels?
   a. pollution
   b. geographical difference
   c. limitless
   d. clean and sustainable
6. Which is not a reason why batteries are not been fully integrated in the power system?
   a. performance issue
   b. safety issue
   c. regulatory barrier
   d. odor pollution
7. Where are solar cells not being used?
   a. providing electricity
   b. running mower
   c. providing hot water
   d. powering spaceships
8. Which is produced from organic material like plants and trees and is used for heating, cooking, and fuel?
   a. biogas
   b. biomass
   c. solar cells
   d. batteries
9. Which of the following is a fossil fuel?
   a. wind
   b. coal
   c. solar
   d. biomass
10. All of the following are renewable energy source, EXCEPT:
    a. solar
    b. geothermal
    c. biomass
    d. natural gas

Lesson 1 Energy Sources

In contemporary times, energy sources primarily refer to the wide variety of fuels used for either heating, generation of electricity, or any other energy conversion processes.

You may have even learned in your previous grades that there are several forms of energy. There is one that comes from falling or moving water. Two others rely on the heat coming from the sun and in the internal heat of the Earth. Indeed, many forms of energy exist.

Are you ready to dive deeper into stuff about energy sources? Keep reading!

What's In

Is the difference between renewable and nonrenewable energy sources clear to you? Let us have a quick recall!

Direction: Classify whether the following is either renewable or nonrenewable. Write RE if it is renewable and NRE if it is nonrenewable. Write your answers in your answer sheet.

1. Geothermal
2. Natural gas
3. Hydropower
4. Coal
5. Oil
6. Biogas
7. Solar
8. Ordinary batteries
9. Biomass
10. Wind

What's New

Have you once imagined being the President of our country? Try the activity below and let us see how well can you manage such problem.

Direction: Using the information and the template below, answer the activity using 4-6 sentences. Write your response in your answer sheet.

Topic: Demands on Energy Source

Problem: Like many countries in the world, the Philippines confronts compound challenges of exponential population growth and rising energy demands. If you are the President of the country, how would you solve the problem?

If I were the president of the Philippines,
_____
_____
_____
_____
_____
_____
_____
_____
_____.

What is it?

There are many forms of energy that exist. These energy sources can be classified into renewable and nonrenewable. Renewable energy sources are replenished naturally over a short time. On the other hand, a nonrenewable energy source will run out of supply once consumed because they are only present in limited amounts.

But, how can we actually harness energy from these sources? To answer this question, keep reading!

A. Fossil Fuels

Fossil fuels are the general term used to refer to combustible products of buried organic matter which underwent partial decomposition under extreme temperature and pressure. These include coal, oil, and natural gas. The components of fossil fuels are heated and vaporized to steam which drives the turbines and generates electricity.

Oil in the form of gasoline is used as engine fuel for vehicles and in generators, lawnmowers, leaf blowers, and small boat motors. Heating applications use natural gas and coal. However, fossil fuel is known to pollute the environment. Its reservoir is limited and will last for 100 years.

B. Biogas

The source of this is animal manure. When bacteria decompose manure anaerobically or without oxygen into a gas mixture composed of about 60 to 70 percent methane biogas is obtained.

This is important in generating heat, hot water, or electricity. The leftover digested manure can be used as fertilizer, bedding, mulch, and potting soil. Biogas enables farmers to produce their own electricity and reduce water contamination, odor pollution, and global warming emissions caused by animal waste.

C. Geothermal

Geothermal energy is the energy harnessed from beneath the earth. There is a high temperature inside the earth's crust caused by the slow delay of radioactive particles. Groundwater will be heated up by the hot rock which will later produce steam. The steam moves turbines. The rotating turbines run the generators.

It is clean, sustainable, and environment-friendly. The problem with this is it can only be produced at selected sites worldwide. The largest group of geothermal power plants in the world is located at The Geysers, a geothermal field in California, United States. In the Philippines, some geothermal power plants include Makiling-Banahaw (MakBan) Geothermal Power Plant in Laguna, Leyte Geothermal Power Plant in Leyte, and Tiwi Geothermal Power plant in Tiwi, Albay.

D. Hydrothermal

Hydrothermal energy refers to the heat obtained from hot water from hydrothermal vents or seawater in contact with hot rock beds. Hot water from hydrothermal vents is collected into a heat exchanger. The heat from the water is transferred to another fluid which evaporates and drives the turbines to generate electricity.

E. Batteries

Batteries are devices that store and convert chemical energy into electrical energy. The energy produced results from a chemical reaction; however, they do not have carbon dioxide emissions.

When it is connected to an external circuit, electrolytes move within the battery, and the chemical reactions are completed at the two terminals of the battery. The movement of electrons generates the current and sends electricity to the external circuit.

For households, batteries can be used to provide back- up power in case of blackouts. Batteries are not considered as major energy supply because of performance and safety issues, regulatory barriers, the resistance of utilities, and cost.

F. Solar Cells

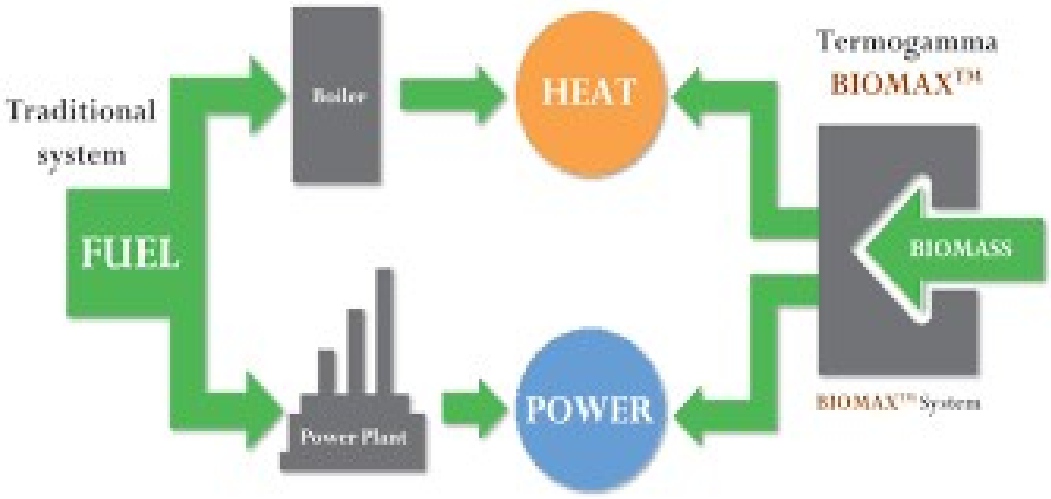
These devices are made up of elemental silicon. Photovoltaic cells or solar cells convert sunlight into electricity. Light energy is collected over panels. The collected energy can be stored in batteries or can be directly converted to electrical energy.

Solar batteries power spaceships and are used to provide electricity for weather instruments in remote areas. Large solar panel fields are often used in the desert to charge small substations, and many homes use solar systems to provide for hot water, cooling and supplement their electricity.

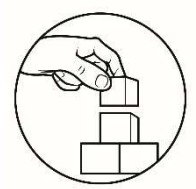
The problem with solar cells is only certain part of the world get enough direct power of the sun to generate usable power from this source because of its geographical location. Aside from that solar energy storage is expensive, weather dependent, and uses a lot of space. Solar energy reduces electricity bills and a renewable source of energy.

G. Biomass

This uses organic material like crops, plants, trees, yard clippings, wood chips, and animal wastes and is commonly used throughout the world. The materials are burnt to generate heat. The heat produced can be directly used to do daily chores like cooking food and boiling water. By burning the biomass in a boiler, the generated heat is used to produce steam which drives the turbines to produce electricity.



One of its issues is that it produces a large amount of carbon dioxide in the atmosphere. This causes air pollution.

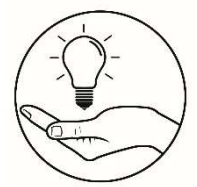


What's More

After reading *What Is It,* how did you find the answers to the questions earlier? Let us see what you have by doing this activity!

Direction: Complete the table by providing the necessary information.

Energy Source	How energy is harnessed?
1. Fossil fuels	
2. Biogas	
3. Geothermal	
4. Hydrothermal	
5. Solar	
6. Batteries	
7. Biomass	



What I Have Learned

Direction: Identify which energy source is described in each item. Write the answer on a separate sheet of paper.

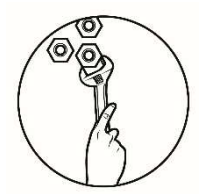
1. This involves the conversion of sunlight into electrical energy using mirrors and boilers or photovoltaic cells, commonly seen on house roofs.

2. This uses pipes buried about 1 meter deep in the earth. Water is pumped through the pipes to transfer the heat indoors. a turbine inside a generator to produce electricity.

3. This involves the use of natural materials like trees and plants to make electricity. It can also use waste products which produce methane.

4. This refers to the heat obtained from hot water from seawater in contact with hot rock beds and produces electricity

5. These are devices that store and convert chemical energy into electrical energy. The energy produced results from a chemical reaction.



What I Can Do

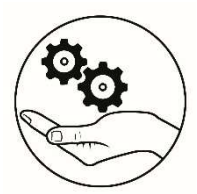
Answer the following questions on a sheet of paper.

1. Fossil fuels will face a shortage of supply in the next 50 years. How can this affect the industries that depend on fossil fuels? How can we respond to this crisis?
2. How would a community be affected by a geothermal resource, such as a hot spring near them?
3. Hydroelectric power plants are distributed in different locations in the Philippines. The majority of these power plants are situated in the mountainous regions of Benguet and in areas of Mindanao. What do you think are the features of these regions that make them good locations for hydroelectric power plants?

Assessment

Direction: Read and analyze the following questions. Write the letter of the correct answer on your answer sheet.

1. It is an energy source derived from the decomposition of bacteria in animal manure into a gas mixture composed of methane gas.
   a. biomass
   b. biogas
   c. geothermal
   d. batteries
2. This source of energy uses organic material like crops, plants, trees, yard clippings, wood chips, and animal wastes and is harnessed for heating and cooking in homes and as a fuel in industrial production.
   a. biomass
   b. biogas
   c. geothermal
   d. batteries
3. Which energy source convert sunlight into electricity and is used to power spaceships and provide electricity for weather instrument, provide for hot water, cooling and supplement electricity and is a renewable source of energy.
   a. batteries
   b. geothermal
   c. hydrothermal
   d. solar cells
4. These can be obtained from natural gas, coal, and oil. These supply power the industries, vehicles, generators, etc. This source of energy is known to pollute the environment.
   a. hydrothermal
   b. geothermal
   c. fossil fuels
   d. Biomass
5. Which of the following explains how energy is harnessed from fossil fuels?
   a. Hot water from hydrothermal vents is collected into a heat exchanger. The heat from the water is transferred to another fluid which evaporates and drives the turbines to generates electricity.
   b. The components are heated and vaporized to steam which drives the turbines and generate electricity.
   c. The materials are burnt to generate heat.
   d. When it is connected to an external circuit, electrolytes move within the battery, and the chemical reactions are completed at the two terminals of the battery. The movement of electrons generate the current and sends electricity to the external circuit.



Additional Activities

Identify the correct answer by arranging the letters in the boxes corresponding the sources of energy. Write the answer on a separate sheet of paper.

1. Convert electricity for chemical potential energy for storage and back to electrical energy

A	E	E	B	E	T	I	R	T

2. Produced from organic material and is used for heating, cooking, and as fuel in industrial production

A	I	B	S	M	S	O

3. Provide power from natural gas, coal, and oil

S	O	F	S	L	I		S	L	E	U	F

4. Harness energy from sunlight and produce electricity

O	L	R	A	S		E	C	S	L	L

5. It uses the heat from the water which is transferred to another fluid and drives the turbines to generate electricity.

Y	L	A	H	M	R	O	H	R	T	E	D

Answer Key

What's In:

1. RE 10.RE
2. NRE
3. RE
4. NRE
5. NRE
6. RE
7. RE
8. NRE
9. RE
10. RE

What I Know:

1. D 10.C
2. A
3. A
4. A
5. A
6. C
7. B
8. B
9. B
10. A

What's More:

1.fossil fuels-buried organic matter produces coal, oil and natural gas

2. Biogas- animal manure produces methane which generates heat and electricity

3. geothermal- heat from the earth produces steam and generate electricity

4. hydrothermal-heat from seawater evaporates, drives turbines and generate electricity

5. solar- elemental silicon converts sunlight into electricity

6. batteries- device that store and convert chemical energy into electricity

7. biomass – organic matter are burnt, generate

Additional Activities:

1. Batteries
2. Biomass
3. Fossil fuels
4. Solar Cells
5. Hydrotherm al

What's New

Answers vary

Assessment:

1. B
2. A
3. D
4. C
5. B

What I Can Do;

Answers vary

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