

PEI created performance tasks designed to introduce middle school students to renewable and non-renewable energy resources. To date, these tasks include the following:

Renewable and Non-renewable Energy

Renewable Energy: Wind

Renewable Energy: Solar

Renewable Energy: Hydropower

Renewable Energy: Geothermal

Renewable Energy: Biomass

The tasks are designed to provide basic background knowledge about renewable energy including what it is, how it works and the advantages and disadvantages for the environment. Each task focuses on a type of renewable energy, including basic background knowledge, career information, and a variety of print and video resources. Students practice the research skills of locating information, selecting the best information and having enough information to explain or persuade.

The first task, ***Renewable and Non-renewable Energy***, culminates in a speech. Teachers are provided with the SBAC Speech rubric for scoring the student presentations. A template is provided for planning speeches. Teachers may adapt these materials as desired.

The Wind, Solar, Hydropower, Biomass, and Geothermal energy tasks are written to culminate in an argumentative essay. Students present a strong argument for the renewable energy source researched, including providing at least one counter argument with rebuttal. Each task includes an essay organizer to support students in writing an argumentative essay. The SBAC Argumentative rubric is included for scoring student work.

Teachers may want to assign additional research for the students prior to writing their essays. Otherwise, students can draw from the information provided in the performance task.

Each task includes a suggested field experience so that students may learn firsthand about the various renewable energy resources. If you are unable to conduct the field experience, you may want to create a virtual experience for the students where they investigate how the renewable energy resource is affecting their local communities.

Field Investigations are being developed for each task. These will be posted on the PEI website as they are created. The field investigations will focus on the science behind energy production and align with the NGSS standards.

Teachers should implement the performance tasks in a time frame that works best for them. The original model from SBAC has students completing Part 1 on day 1 and Part 2 on day 2. This may be inadequate for diving deeply into the research materials and ELA skills. Most likely, each performance task will fit into a period of three to five-day time period.

The main purpose of these tasks is to integrate ELA skills, including reading, writing, listening and speaking, with science content. Think of the tasks as a gateway into a more in-depth study of renewable energy and an opportunity to practice and apply a wide variety of ELA skills. Make the materials work for you and for your students. And do feel free to contact PEI for additional support!



Task: Renewable and Non-Renewable Energy



PART I: Research Student Directions

Your Assignment:

One of the most important issues for our world today is the production of energy. We rely on energy to run our homes, businesses, and transportation. You have been asked to give a speech that explains the difference between renewable and non-renewable energy and shows your audience why shifting to renewable energy sources is best for our environment and our future.

Steps you will follow:

To plan and compose your speech, you will do the following:

1. Read an article, two infographics and watch two videos.
2. Answer three questions about the media sources.
3. Visit a renewable energy site or listen to speakers.
4. Compose and deliver your speech.



Directions for beginning:

You will read the article, view the infographics and watch two videos, taking notes with the template provided. You may refer back to the media sources and your notes when writing your speech.

Source Information:

- Source #1: **Article:** *Energy Basics: Renewable and Non-renewable Energy Sources* Article - based on information from the EIA website - *What is Energy? Explained.*
Source Link: <https://www.eia.gov/energyexplained/>
- Source #2: Infographic #1: Renewable Energy and Infographic #2: Non-renewable Energy
- Source #3: **Video:** *Bill Nye: Renewable Energy* (3:07) <https://youtu.be/grl3BDSGEC4>
or *Renewable Energy 101* National Geographic (3:16) <https://youtu.be/1kUE0BZtTRc>
- Source #4: **Career Video:** *Careers in Renewable Energy* (4:16)
<https://www.youtube.com/watch?v=o42DtGQPg5k>



Task: Renewable and Non-Renewable Energy



Note-taking Template

Source	Definition and Examples: Renewable Energy	Advantages of Renewable Energy	Definition and Examples: Non-renewable Energy	Disadvantages of Non-renewable energy
Source #1: Energy Basics: Renewable and Non-renewable Energy Sources				
Source 2: Infographic #1 - Renewable Energy				



Task: Renewable and Non-Renewable Energy



Source	Definition and Examples: Renewable Energy	Advantages of Renewable Energy	Definition and Examples: Non-renewable Energy	Disadvantages of Non-renewable energy
Source #2: Infographic #2- Non-renewable Energy				
Source #3: Video - Bill Nye or National Geographic				



Task: Renewable and Non-Renewable Energy



Career Video Note-taking Template

Energy Source	Types of Jobs	Key qualifications	Benefits of working in this industry
Solar			
Wind			
Wave			



Task: Renewable and Non-Renewable Energy



Source #1: Article

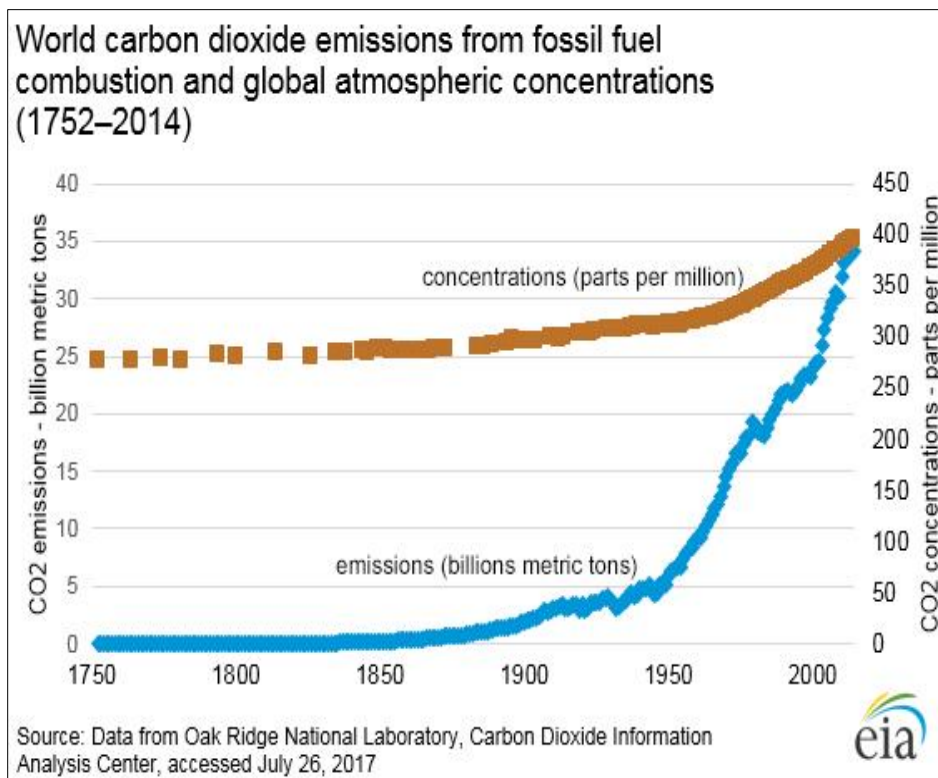
Energy Basics: Shifting from Non-renewable to Renewable Energy Sources

Over the last 200 years an ever-increasing proportion of our energy has come from non-renewable sources such as oil and coal. While demand for energy rises, these resources are running out. There is also evidence that the non-renewable resources are harmful to the environment. Therefore, scientists are actively exploring the use of renewable sources of energy for the future.

All life on earth is sustained by energy from the sun. Plants and animals can store energy and some of this energy remains with them when they die. It is the remains of these ancient animals and plants that make up fossil fuels.

Fossil fuels are **non-renewable** which means they are a resource that cannot be replaced when it is used up such as oil, natural gas or coal. Also, burning fossil fuels generates greenhouse gases. These are naturally occurring gases in the atmosphere such as carbon dioxide, methane, and nitrous oxide. Data shows that these gases have increased over the last 250 years. Most of the increase in greenhouse gases is in the last 100 years.

Fossil Fuel: Fuels such as coal, gas, and oil which are mined from the earth and burned to produce energy. They are formed from broken down animals and plants that died a very long time ago.





Task: Renewable and Non-Renewable Energy




Scientists know that increasing amounts of greenhouse gases in the atmosphere tend to warm the planet. In computer-based models, rising concentrations of greenhouse gases produce an increase in the average surface temperature of the earth over time. Rising temperatures may produce changes in precipitation patterns, storm severity, the melting of the ice caps, and rising sea levels. This is commonly referred to as climate change.

What can we do to stop the pollution from fossil fuels? Simply put, we need to find more renewable, sustainable ways of generating energy.

Renewable resources are sources of power that quickly replenish themselves like water and wind and can be used again and again. Renewable resources include wind power, solar energy, geothermal energy, biofuel and hydropower. These renewable energy sources, when making electricity, do not produce greenhouse gases and therefore, do not contribute to global warming and climate change.

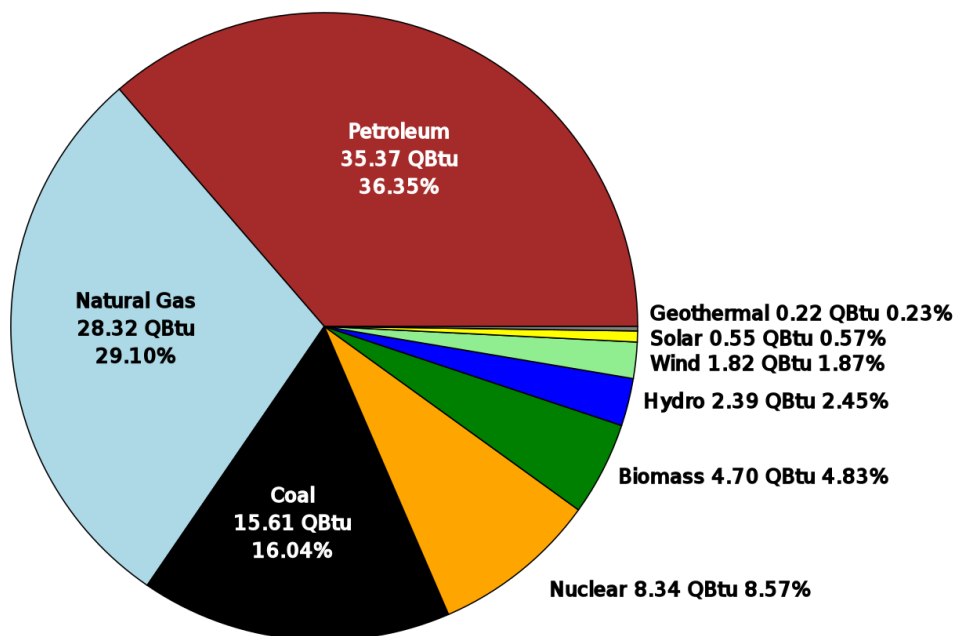
The chart below shows the energy sources used in the United States. (US Energy Information Association). We have a long way to go to change our dependency from non-renewable energy sources to renewable sources of energy. The future of our world depends on us making this change. At risk is the health of our environment and access to the power we need to keep our homes, businesses, and transportation running.

Did you know?



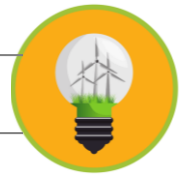
Fossil fuels supplied about 81% of the primary energy consumed in the United States and were responsible for about 93% of total U.S. carbon dioxide emissions from human activity in 2015.

United States Primary Energy Consumption by Source (2015)





Task: Renewable and Non-Renewable Energy



Source #2: Infographic #1 - Renewable Energy

Renewable energy



What is renewable energy?

- Renewable energy comes from sources that won't run out, including:
 - the sun
 - the wind
 - the waves and tides
 - natural underground heat
 - energy crops, wood and waste.
- We can use renewable energy to provide electricity and heat for homes and businesses.

Why do we need renewable energy?

- Most of the electricity we use in the UK comes from non-renewable sources, such as coal and gas.
- These 'fossil fuels' are running out.
- Burning them to provide energy also releases gases that contribute to climate change.
- Renewable sources of energy don't run out or pollute the environment.

Why don't we get all our electricity from renewable energy?

- It is important to have a mix of energy sources so, if one fails, another can be used. Also, many renewable technologies are still being developed.

Wind energy

Giant machines, called wind turbines, can be used to make electricity in windy places. Groups of wind turbines – or wind farms – are being built on land and out at sea.

Hydroelectric energy

Hydroelectric energy means energy from moving water. Water flowing from a reservoir to a river through a hydroelectric dam can be used to make power.

Biomass energy

Biomass is plant and animal matter (e.g. wood, straw, trees grown for fuel, or sewage and waste food), or trees grown for fuel. We can burn biomass to produce heat and electricity.

Hydrogen fuel cells

Hydrogen fuel cells make 'clean' electricity from hydrogen gas. They work like batteries, and can power cars or buses.

Geothermal energy

Geothermal energy means the natural heat of the Earth. Geothermal power stations use heat from deep underground to generate electricity.

Solar energy

Solar energy means energy from the sun. The sun's light and heat can be captured by solar panels and turned into electricity or used to heat water.

Tidal energy

Every day, the tide at the seaside goes in and out, as the sea rises and falls. Marine turbines can use this movement to generate electric power.

Wave energy

Waves are made when wind blows across the sea. The energy in waves can be used to make electricity by new technology such as the Pelamis wave machine.

It's Only Natural

See www.dft.gov.uk/renewables/schools

Image Credit: [The National Archives](#)



Source #2: Infographic #2 - Non-renewable Energy

Non-renewable energy

What are non-renewable sources of energy?

- Most of the UK's electricity is generated by power stations that burn coal and gas.
- Our cars use petrol and diesel, which come from oil.

What are fossil fuels?

- Coal, oil and gas are called fossil fuels.
- They are formed from the fossilised remains of prehistoric plants.
- The plants became buried deep under the land and sea, slowly turning into coal, oil and gas over millions of years.

What's the problem?

- Fossil fuels can't be renewed.
- One day, the Earth's reserves of these fuels will run out.
- Scientists think that gases released when fossil fuels burn are causing climate change and pollution.

Coal

At a coal mine, shafts are dug to reach layers of coal deep below the Earth's surface or from open-cast mines on the surface.

Electricity

Electricity is needed to make lots of things work, e.g. heating, lighting. Tall pylons support cables that carry electricity safely to where it's needed. The cables may also run underground.

Oil and gas

Oil and gas under the sea is collected by special platforms. Oil and gas can be burned to make electricity.

Power stations

Electricity is made in big buildings called power stations. They burn coal or oil to make power. Some power stations produce electricity from nuclear energy.

It's Only Natural
See www.dfi.gov.uk/renewables/schools

Image Credit: The National Archives



PART 2: Renewable Energy Field Experience

Arrange to take your students on a visit to a renewable energy site such as a wind farm, a business using solar energy, a hydropower plant or a farm where biofuels are used to generate electricity. Plan the field experience prior to the students writing and presenting their speeches. Encourage the students to use information they learn about the benefits of using renewable energy, including employment opportunities, in their speeches.

Renewable Energy Field Experience

Note-taking Template

Date:

Brief description of experience:

Benefits of this type of renewable energy:

Challenges we face using this type of renewable energy:

How we can address these challenges:

Career opportunities available for this field of renewable energy:



PART 3: Speech

Student Directions:

You will have time to review your notes and plan your speech. You may use notes from the sources and from the renewable energy field experience to write your speech. You may also refer back to the sources, if needed. Read your assignment and the information about how your speech will be scored, then begin your work.



Your assignment:

You have been asked to speak at an awareness night, helping community members understand issues we face with our energy resources. In your speech, be sure to include the following:

- Explain what we mean by renewable versus non-renewable energy
- Share why it is important to make the shift to renewable energy resources. Consider the availability of the resource, impact on the environment and potential employment opportunities.

Include at least two visuals in your speech. Your speech should be no more than three minutes in length. Use the planning template to help you to compose your speech.

How your speech will be scored:

1. **Focus** - how well your speech clearly introduces and communicates your ideas.
2. **Organization** – how well your ideas flow from the opening to the conclusion and how well you stay on topic throughout the speech.
3. **Elaboration of Evidence** – how well you use sources, facts, pictures, and details as evidence.
4. **Language and Vocabulary**- how well you effectively express ideas using precise language that is appropriate for your audience and purpose.
5. **Presentation**- how well your speech is presented, including eye contact, pronunciation and awareness of audience.

Now begin work on your speech:

- Review your notes
- Plan your speech using the template provided
- Your speech should be three minutes long





Task: Renewable and Non-Renewable Energy



Outlining My Speech

Speech Components:	Supporting Visuals (Minimum of two)
Introduction: capture the audiences' attention!	
Explain the difference between renewable versus non-renewable energy sources with examples:	
Explain why we should continue to make the shift to renewable energy sources including the following: Availability of the resource: Impact on the environment: Potential employment opportunities:	
Provide a persuasive conclusion:	



Task: Renewable and Non-Renewable Energy



SCORING VERSION

4 – Point Speech Rubric (Grades 3-11)				
Score	4	3	2	1
Focus	The speech is consistently and purposefully focused: <ul style="list-style-type: none"> controlling idea, opinion, or claim is clearly stated and strongly maintained controlling idea, opinion or claim is introduced and communicated clearly within the context 	The speech is adequately and generally focused: <ul style="list-style-type: none"> controlling idea, opinion, or claim is clear and for the most part maintained though some loosely related material may be present some context for the controlling idea, opinion, or claim 	The speech is somewhat unclear and unfocused: <ul style="list-style-type: none"> controlling idea, opinion, or claim is for the most part maintained though there may be a minor drift controlling idea, opinion, or claim may be lacking an appropriate context 	The speech is unclear and unfocused: <ul style="list-style-type: none"> controlling idea, opinion, or claim may have a major drift controlling idea, opinion, or claim may be confusing or ambiguous
Organization	The speech has a clear and effective organizational structure helping create unity and completeness: <ul style="list-style-type: none"> employs a strong opening and logical progression of ideas effective introduction and conclusion for audience and purpose 	The speech has an evident organizational structure and a sense of completeness, though some ideas may be loosely connected: <ul style="list-style-type: none"> adequate use of transitional strategies with some variety ideas progress from beginning to end introduction and conclusion are adequate adequate, if slightly inconsistent, connection among ideas 	The speech has an inconsistent organizational structure: <ul style="list-style-type: none"> inconsistent use of transitional strategies with little variety ideas progress unevenly from beginning to end introduction and conclusion, if present, any be weak weak connection among ideas 	The speech has little or no discernible organizational structure: <ul style="list-style-type: none"> few or no transitional strategies are evident frequent extraneous ideas may intrude
Elaboration of Evidence	The speech provided thorough and convincing support/evidence for the writer’s controlling idea, opinion, or claim that includes the effective use of sources, facts, and details: <ul style="list-style-type: none"> use of evidence from sources is smoothly integrated 	The speech provides adequate support/evidence for the writer’s controlling idea, opinion, or claim that includes the use of sources, facts, and details: <ul style="list-style-type: none"> some evidence from sources is smoothly integrated though may be general or imprecise 	The response provides uneven, cursory support/evidence for the writer’s controlling idea, opinion, or claim that includes partial or superficial use of sources, facts, and details: <ul style="list-style-type: none"> evidence from sources is weakly integrated 	The speech provides minimal support/evidence for the writer’s controlling idea, opinion, or claim that includes little or no use of sources, facts, or details,: <ul style="list-style-type: none"> use of evidence from the source material is minimal, absent, in error, or irrelevant
Language and Vocabulary	The speech clearly and effectively expresses ideas: <ul style="list-style-type: none"> use of precise language (including academic and domain-specific language) consistent use of syntax and discourse appropriate to the audience and purpose 	The speech adequately expresses ideas employing a mix of precise with more general language: <ul style="list-style-type: none"> use of use of academic and domain-specific language is adequate use of syntax and discourse generally appropriate to the audience and purpose 	The speech inconsistently expresses ideas employing simplistic language: <ul style="list-style-type: none"> use of domain-specific insufficient use of academic and domain-specific language use of syntax and discourse may at times be inappropriate to the audience and purpose 	The speech expresses vague ideas, lacks clarity, or is confusing: <ul style="list-style-type: none"> uses limited language or domain-specific vocabulary rudimentary use of syntax and discourse inappropriate for the audience and purpose
Presentation	The speech is clearly and smoothly presented: <ul style="list-style-type: none"> use of effective eye contact and volume with clear pronunciation understandable pace adapted to the audience consistently aware of audience’s engagement use of strong visual/ graphics/ audio enhancement, when appropriate, to effectively clarify message. 	The speech is adequately presented with minor flaws: <ul style="list-style-type: none"> appropriate use of eye contact volume, and pronunciation generally understandable pace adapted to the audience sufficiently aware of audience’s engagement sufficient use of visual/graphics/audio enhancements, when appropriate, to clarify message 	The speech is unevenly presented with evident flaws: <ul style="list-style-type: none"> inconsistent use of eye contact, volume, and pronunciation pace partially adapted to the audience partially aware of audience’s engagement sufficient use of visual/graphics/ audio enhancement, when appropriate, to clarify message 	The speech is presented with serious flaws that obscure meaning: <ul style="list-style-type: none"> infrequent eye contact, and inappropriate volume and pronunciation pace not adapted to the audience little or no sense of audience’s engagement