Sample BUF: Science & Spanish Language Arts Unit 3

Grade: 4th	**Language:** Spanish	**Content areas:** Science and Spanish Language Arts
Unit Number: 3 **Unit Name:** Our Quest for Energy		
Essential Question: How does our quest for energy impact our natural environment?		

Unit Standards Link to Unpacked Standards into Outcomes Document for this Unit https://bit.ly/4e6aTLb	

Content Standards: NGSS	**CCSS Writing Standards** **Opinion (Essay)**	**CCSS Reading Standards** **Informational Texts**
4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources, and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.] **3-5 ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	**W.4.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. ● Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose. ● Provide reasons that are supported by facts and details. ● Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition). ● Provide a concluding statement or section related to the opinion presented. **W.4.4** Produce clear and coherent writing in	**RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. **RI.4.3** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. **RI.4.4** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area. **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the

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3-5 ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	which the development and organization are appropriate to task, purpose, and audience. **W.4.6** With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting. **W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources. **W.4.10** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	information contributes to an understanding of the text in which it appears. **RI.4.10** By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range. **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. ● W.4.9B Apply grade 4 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").
Foundational Skills: **RF.4.3** — Know and apply grade-level phonics and word analysis skills in decoding words.	**Listening and Speaking:** **SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. **SL.4.3** Identify the reasons and evidence a speaker provides to support particular points.	**Language:** **L.4.2** Demonstrate command of the conventions of standard Spanish capitalization, punctuation, and spelling when writing.

<u>Marco de los estándares del desarrollo auténtico del lenguaje español de WIDA</u>

<u>Estándar 1 del Marco DALE: El lenguaje para socializar y aprender (DALE-SA)</u>

DALE- SA.4-5. Argumentar. Interpretativo: Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán interpretar argumentos para...

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- formar opiniones, premisas o interpretaciones

DALE-SA.4-5. Argumentar. Expresivo: Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán expresar argumentos para...

- ofrecer opiniones, premisas o interpretaciones

Estándar 2 del Marco DALE: El lenguaje para las artes del lenguaje (DALE-AL)

DALE-AL.4-5. Informar. Interpretativo Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán interpretar información para identificar detalles precisos para...

- definir, describir, comparar y clasificar temas

DALE-AL.4-5. Informar. Expresivo Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán expresar información para añadir precisión y detalles para definir, describir, comparar y clasificar temas por medio de...

- oraciones compuestas subordinadas adverbiales de relación lógica (p. ej., causales, finales, condicionales)
- guiones y paréntesis explicativos

Estándar 4 del Marco DALE: El lenguaje para las ciencias naturales (DALE-CN)

DALE-CN.4-5. Argumentar. Interpretativo Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán interpretar argumentos para...

- conectar razonamientos, evidencias relevantes, datos y/o modelos al generar una postura

DALE-CN.4-5. Argumentar. Expresivo Por medio de su repertorio lingüístico y utilizando artefactos multimodales, los estudiantes bi/multilingües podrán expresar argumentos para...

- hacer y definir posturas basadas en evidencias, datos y/o modelos por medio de...
    - conectores para enlazar ideas (p. ej., por lo tanto, entonces)
    - representaciones multimodales (p. ej., diagramas, mapas, gráficos, datos)

Unit Big Ideas

Science Content Big Ideas:

1. I want my students to understand that the energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways (4-ESS3-1).
    a. For example, building a dam for hydropower can lead to a loss of habitat.
    b. For example, burning fossil fuels to power the lights in a school can cause air pollution.
2. I want my students to understand that some resources are renewable over time, and others are not.
    a. For example, wind energy, hydroelectric power (water energy), and sunlight are renewable energy sources because they regenerate naturally.
    b. For example, fossil fuels and fissile materials are non-renewable energy sources because they are limited.

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Science Inquiry Big Ideas:

1. I want my students to understand that any application of a science or engineering solution to a problem has both intended and unintended consequences (4-ESS3-1).
    a. For example, the creation of wind farms impacts the environment by creating a renewable energy source (intended) and causing habitat loss and fragmentation (unintended).
    b. For example, when coal (a fossil fuel) burns to provide energy (intended), it releases pollutants in the air that cause smog, acid rain, and toxins in the environment that lead to health issues in people (unintended).

Engineering, Technology, and Science Integration:

1. I want my students to understand that possible solutions to a problem are limited by cost, available materials, time, space, and impact on the environment (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account (3-5-ETS1-1).
    a. For example, the simple design problem that reflects the need to make the school's quest for energy have less of an impact on the environment may be limited to renewable sources of energy.
    b. For example, the simple design problem that reflects the need to make the school's quest for energy have less impact on the environment is limited by the budget allocated for the project.
2. I want my students to understand that researching a problem before designing a solution will result in a more effective solution. Testing a solution involves investigating how well it performs under a range of likely conditions (3-5-ETS1-2).
    a. For example, students will research the energy needs in their school before working on designing a solution to meet these energy needs.
    b. For example, students will research (through photographs, videos, field trips, or guest speakers like an electronic engineer) how well renewable energy sources perform with minimal environmental effects on other schools or similar structures in the areas to inform the development of their proposed solutions.
3. I want my students to understand that at whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs (3-5-ETS1-2).
    a. For example, students can share their initial design idea seeking feedback on how to improve the design before submitting a final proposal.
    b. For example, after some research, students can share their plan for identifying the space and location for their proposed renewable energy source and adapt it after receiving feedback.

Language Arts Big Ideas: I want students to understand that when reading complex, grade-level **informational** text (RI.4.10), it is important to

- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text (RI.4.1).
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why based on specific information in the text (RI.4.3).

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- Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area (RI.4.4).
- Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears (RI.4.7).
- Draw evidence from literary texts to support analysis, reflection, and research (W.4.9).

…to be able to write their own **opinion essay** (W.4.1) where they

- Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose (W.4.1A).
- Provide reasons that are supported by facts and details (W.4.1B).
- Link opinion and reasons using words and phrases (e.g., *for instance*, *in order to*, *in addition*) (W.4.1C).
- Provide a concluding statement or section related to the opinion presented (W.4.1D).

respond to the questions, Can the United States really be 100% carbon-free by the year 2050 by only relying on renewable energy? Is this a realistic goal?

Performance-Based Summative Assessment
Performance-Based Summative Assessment - The performance-based assessment will ask each student to use what they have learned about renewable and non-renewable sources of energy and the environmental impacts of their use in order to create a poster that illustrates the benefits and challenges of one specific energy source.

Unit Flow Chart		
Unit Launch: Initial Oracy for Science Students will develop oracy and background knowledge around energy and fuels that come from renewable and non-renewable natural resources.		
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Investigation 1: Science Inquiry and Literacy (reading to build knowledge about the science topic and writing about the science topic) In the first investigation of the unit, students use the oracy developed during the unit launch (and more if necessary) to gather and combine information about different renewable and non-renewable energy sources and their uses. Students will use the	↔	Using texts about renewable and non-renewable resources, their uses, and the environmental impact of the use of renewable and non-renewable energy sources… **Oracy Reading Specific Informational Texts:**

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information gathered in writing their opinion essay (described below) and in the collaborative problem-solving project (described below). Foundational Skills, Speaking and Listening, Language, and Language Development Standards to be integrated will be identified and added later.		Students build oracy around the language of the reading standards AND the content compatible and content obligatory language in the text in anticipation of formal reading instruction.
Investigation 2: Science Inquiry and Literacy (reading to build knowledge about the science topic and writing about the science topic) In the second investigation of the unit, students continue to develop oracy and gather and combine information on the environmental impact of the use of both renewable and non-renewable sources of energy. This information will also be used when writing their opinion essay (described below) and in the collaborative problem-solving project (described below). Foundational Skills, Speaking and Listening, Language, and Language Development Standards to be integrated will be identified and added later.		**Reading and Responding to Informational Texts:** Students engage in formal reading instruction, using informational texts, and focusing on the skills and expectations of the informational reading standards. Students respond to text both orally and in writing. Foundational Skills, Speaking and Listening, Language, and Language Development Standards to be integrated will be identified and added later.
↓		
Science and Engineering Collaborative Problem-Solving Project After obtaining and combining information about renewable and non-renewable resources from the two unit investigations (described above), students will apply what they have learned in a collaborative problem solving project. Working in small groups, students will propose options for reducing their school's dependence on non-renewable energy. First each group will identify and define a problem related to the school's use of non-renewable energy sources. For example, one student group may decide to focus on the fact that school's heating system uses only use non-renewable energy. Then, students will identify the want or need (the desire to reduce the school's dependence on non-renewable energy) and, finally, generate at an option to address the problem. The proposed solutions will meet the defined constraints (cost, materials, time) and limits (space and impact on the environment) and students will use what they have learned from their investigations research to describe the possible effects of their proposed options.		**Writing: Opinion Essay** Students will apply the knowledge and conceptual understanding they have developed throughout the unit to write an Opinion Essay where they respond to the question: *Should the United States try to be 100% carbon-free by the year 2050 by relying on clean energy such as renewable energy, nuclear energy, or waste?* If necessary, students will develop oracy on any content compatible and content obligatory language necessary to successfully write their essays. Foundational Skills, Speaking and Listening, Language, and Language Development

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Foundational Skills, Speaking and Listening, Language, and Language Development Standards to be integrated will be identified and added later.		Standards to be integrated will be identified and added later.

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Performance-Based Summative Assessment

The performance-based assessment will ask each student to use what they have learned about renewable and non-renewable sources of energy and the environmental impacts of their use in order to create a poster that illustrates the benefits and challenges of one specific energy source.

Unit Storyline

In this third integrated science and Spanish Language Arts unit of the year, students will engage in inquiry around energy and fuels. Specifically, students will investigate how energy and fuels are derived from natural resources (both renewable and non-renewable) and how their uses affect the environment (**4-ESS3-1**). This unit's investigations and inquiry will allow students to implement the science and engineering practice of obtaining and combining information from books and other reliable media to explain phenomena, rather than from constructing and using models (as in unit 1) or from collecting evidence from their own hand-on experiences (as in unit 2). Students will work on a collaborative problem-solving project where they will apply what they have learned about sources of energy to propose options for reducing their school's dependence on non-renewable energy (**3-5 ETS1-1, 3-5 ETS1-2**). At the culmination of the unit, the performance-based assessment will ask each student to use what they have learned about renewable and non-renewable sources of energy and the environmental impacts of their use in order to create a poster that illustrates the benefits and challenges of one specific energy source.

As students work to obtain and combine information about the fuels and the effects of their uses on the environment (**4-ESS3-1**), they will also focus on meeting reading informational text standards **(RI 4.1**, **RI 4.3, RI 4.4, RI 4.7, RI 4.10)**. In addition, students will work to meet writing standards as they take notes on the texts they read and as they write an opinion piece based on the information they have collected (**W.4.1, W.4.4, W.4.6, W.4.8, W.4.9, W.4.10**). Their opinion essay will respond to the question: *Should the United States try to be 100% carbon-free by the year 2050 by relying on clean energy such as renewable energy, nuclear energy, or waste?*

Science Inquiry:

Over the course of the unit, students will engage in <u>two</u> different investigations to build their understanding of sources of energy and how their uses affect the environment (**4-ESS3-1**). In each investigation, the students will gather and combine information from a variety of print and media sources (including but not limited to books, online articles, state government energy websites, charts, diagrams, and graphs) (**4-ESS3-1**). As the students gather and combine information during the investigations, the teacher will have the opportunity to support students in taking notes and categorizing the information collected, and in providing a list of sources (**W.4.8, W.4.9, W.4.10)**.

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The **first investigation** will focus on gathering and combining information ***in order to understand the difference between renewable resources*** (like wind, water, and solar, which renew over time) ***and non-renewable resources*** (such as fossil fuels and fissile material, which do not renew) and to describe some ways that each of these sources of energy are used.

In the **second investigation**, students will investigate the ***environmental impact of the use of both renewable and non-renewable sources of energy***. For example, students will discover that dams, which use a renewable source of energy (water) and surface mining for coal (a non-renewable source of energy) BOTH cause the loss of habitats for a variety of plants and animals. While students may consult print and media resources about the environmental impact of using both renewable and non-renewable energy sources at the national level and even at the international level, special emphasis will be placed on supporting student investigation about the effects at the local level.

Reading:
As students are working on these investigations, they will also be engaging in formal reading instruction. Students will have the opportunity to read the same informational texts for multiple purposes: to obtain and combine information about sources of energy and fuels and the effects of their use on the environment AND to meet the rigor of the fourth grade reading standards included in this unit of instruction. For both their science investigations and to meet the reading standards, students may read texts such as*, *Aprender sobre la energía eólica*, *Aprender sobre la energía solar*, and *Aprender sobre el carbón, el petróleo y el gas natural*.

Formal reading instruction will focus on referring to details and examples when explaining what the text says explicitly and when drawing inferences from the text (**RI 4.1**) and on explaining (including what happened and why) events, procedures, ideas, or concepts in a scientific or technical text based on specific information in the text (**RI 4.3**). Students will also interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text (**RI 4.7**). While students engage with these texts, they will work to determine the meaning of general academic and domain-specific words or phrases. (**RI 4.4**).

Reading Foundational Skills, Language, and Speaking/Listening:
Explicit, systematic instruction in foundational literacy skills is essential for all learners — and especially for multilingual learners developing biliteracy. While foundational skills application should be integrated within meaningful content and language learning, the specific skills taught must follow a clearly defined, explicit, and systematic progression in the language of instruction. To prevent misunderstandings and ensure rigorous development, teachers should engage students in the daily use of a well-developed word recognition program and materials selected by the district that reflect the internal structure of each program language and are taught systematically and explicitly.

Critically, for these skills to transfer and stick, they cannot exist in isolation. Word recognition and language comprehension should be explicitly connected, especially for developing bilinguals, and the foundational skills portion of the BUF provides a context for this connection. The unit's theme/topic/meaningful frame contributes to the selection of the words and phrases that are used within word recognition as part of the BUF,

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connecting decoding to language students are already hearing, speaking, and exploring. Additionally, because foundational skills do not always transfer across languages on their own, educators must explicitly identify and teach cross-linguistic connections, pointing out what is shared across languages while drawing deliberate attention to language-specific features that require distinct instruction.

Because this unit is developing Spanish literacy, word recognition instruction in the BUF should be grounded in the Reading Foundational Skills and Language standards outlined in the Common Core en Español, with particular attention to the needs of multilingual learners. These standards are central to building accurate, language-specific literacy pathways for developing bilinguals and should be considered alongside cross-linguistic transfer — recognizing which skills and understandings students can leverage from English literacy learning and which features of Spanish require distinct, explicit instruction. Ideally, the selection of foundational skills and language standards (as well as speaking and listening standards) embedded in each learning opportunity should be informed both by student need — including language proficiency levels and prior exposure to concepts — and by a coherent literacy progression in the language of instruction, with unit content providing the meaningful context for application and reinforcement.

Science and Engineering:
Students will have the opportunity to use the information they have collected during the two unit investigations to engage in a collaborative problem-solving project (**4-ESS3-1, 3-5 ETS1-1, 3-5 ETS1-**2) and to write and publish an opinion essay (**W.4.1, W.4.4, W.4.6, W.4.8, W.4.9, W.4.10**).

The collaborative problem-solving project will have the students working in small groups to propose options for reducing their school's dependence on non-renewable energy. Supported and guided by the teacher, each group will identify and define a problem related to the school's use of non-renewable energy sources. For example, one student group may decide to focus on the fact that school's heating system uses only non-renewable energy. Then, students will identify the want or need (the desire to reduce the school's dependence on non-renewable energy) and, finally, generate at least two possible options to address the problem. The proposed solutions will meet collaboratively established constraints (cost, materials, time) and limits (space and impact on the environment), and students will use what they have learned from their investigations research to describe the possible effects of their proposed options (**4-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2**).

Writing:
The opinion essay will respond to the question: *Should the United States really be 100% carbon-free by the year 2050 by relying on clean energy such as renewable energy, nuclear energy, or waste?* To support students in writing an opinion essay, teachers will want to provide students with the opportunity to read articles like* *Opinión energías renovables para todos, Carta al director en Chile,* and *Los costos ambientales de la energía renovable son asombrosos,* making sure students pay particular attention to how the authors use reasons and evidence to support particular points (**W.4.9B**) and having students note the words and phrases the authors use to express their opinions (**W.4.1**). As the students read these mentor texts, the teacher can engage the students in mini lessons that highlight the structure and organization of an opinion text, working with the students to write a collaboratively created opinion piece to further support student writing of their own opinion pieces. Additional writing mini lessons will focus on creating an organizational structure in which ideas are used to support their opinion, providing facts and details that

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support their reasons, linking opinion and reasons using words and phrases (e.g., for instance, in order to, in addition), and providing a concluding statement related to the opinion presented (**W.4.1**).

Performance-Based Summative Assessment:
The performance-based assessment will ask each student will use what they have learned about renewable and non-renewable sources of energy and the environmental impacts of their use in order to create a poster that illustrates the benefits and challenges of one specific energy source.

***Disclaimer:** The texts included in this unit have been suggested by librarians or collected from other sources. These texts have not been vetted for content or readability level. They are not an exhaustive nor recommended list; they have been included as samples to confirm that texts on the topic and in the genre are available in the language of instruction. The district is responsible for obtaining and vetting texts for this unit.

Biliteracy Unit Framework Components

Building Initial Oracy and Background Knowledge: Language Comprehension - Using strategies such as Concept Attainment, Sorts, Sentence Prompts, TPR, Adapted Reader Theater (ART), etc., students develop initial oracy and background knowledge. Throughout the unit, oracy for academic language found in informational texts, reading, and writing skills from the language of the standards, and content-specific academic language continue to be developed. (See the Reading Comprehension, Writing, and Content section below).

4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources, and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

Strategies to use may include:

- Concept Attainment (p.81-82): Through analysis of a series of photos shared by the teacher, students will attain the concepts of renewable and non-renewable natural resources **4-ESS3-1**
    - Images for: *la luz solar, el viento, el agua corriente, el carbón, el petróleo, el gas natural, los recursos naturales, renovables, no renovables*
- Concept Attainment or Picture Sort (p.83): Students match images into pairs (closed sort) by determining the relationship between the images (renewable energy source and how we harness the energy and non-renewable energy source and how we extract the resource) **4-ESS3-1**
    - Images: *la luz solar, el viento, el agua corriente, el carbón, el petróleo, el gas natural, los paneles solares, la represa hidroeléctrica, las turbinas eólicas, la plataforma petrolera, las bombas de fracturación, la minería del carbón, el pozo de gas natural, extrae, captura, el aparato o el mecanismo*

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- Sentence Prompts (p. 83) with images used to scaffold students in producing complete sentences when observing examples of natural resources. **4-ESS3-1**
    - *Yo observo __.*
    - *En las dos fotos observo ___.*
    - *EN las tres fotos hay ___.*
    - *En las cuatro fotos noto que ___.*
    - *Lo que tienen en común todas las fotos es __.*
    - *Todas las fotos son ejemplos de ___.*
    - *Los recursos naturales a la izquierda don el/la ___.*
    - *Los recursos naturales a la derecha son el/la __.*
    - *Pienso que los recursos naturales a la izquierda están juntos porque ___.*
    - *Tal vez los recursos naturales a la derecha están untos porque __.*
- Total Physical Response (p. 81): Receptive and productive language will be developed around academic terms associated with natural resources and renewable and non-renewable energy sources. **4-ESS3-1**
    - *Los recursos naturales, la luz solar, el viento, el agua corriente, el carbón, el petróleo, el gas natural, recursos naturales renovables, recursos naturales no renovables*
    - *Las fuentes de energía renovables, las fuentes de energía no renovables, los paneles solares, la represa hidroeléctrica, las turbinas eólicas, la plataforma petrolera, las bombas de fracturación, la minería del carbón*
    - *Los recursos renovables se pueden reponer, los recursos no renovables no se pueden reponer.*
- Adapted Reader's Theater (p.81-82): Through the teacher's narration and the active participation of the students (via movements, images, etc.), the students understand the concepts and acquire receptive language (and, when appropriate, also productive language) on the concepts of natural resources and renewable and non-renewable energy sources. **4-ESS3-1**
    - *Utilizamos los recursos naturales todos los días.*
    - *Utilizamos varios recursos naturales como fuentes de energía.*
    - *Algunos recursos naturales son renovables.*
    - *Otros recursos naturales no son renovables.*
    - *Los recursos renovables se pueden reponer.*
    - *Los recursos no renovables no se pueden reponer.*
    - *Los paneles solares utilizan la luz solar para generar energía.*
    - *Las represas de agua utilizan el agua para generar energía.*
    - *Las turbinas eólicas utilizan el aire para generar energía.*
    - *En las plataformas petroleras se extrae el petróleo, un combustible fósil.*
    - *Las bombas de fracturación extraen el gas natural, un combustible fósil.*
    - *De las minerías de carbón, se extrae el carbón, un combustible fósil.*

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Oracy begins with initial content oracy development, then continues throughout the unit so that students develop more complex oracy necessary for further inquiry. In reading, oracy is developed around the language of the reading standards as well as any additional terms or concepts necessary to comprehend a specific text prior to reading.

Reading Comprehension: Throughout this unit, informational texts will be used for *three* purposes:

(1) to gather information (research) as a part of inquiry and learn more renewable and non-renewable energy sources, their uses, and their effect on their environment,
(2) to gather information to use in their opinion essays (described in the writing section below), and
(3) to apply the skills of the reading standards listed below (orally and in writing)

- **RI 4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- **RI.4.4** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- **RI 4.10** By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.
- **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.
    - W.4.9B Apply grade 4 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").

Content: In this unit, students will engage in two investigations to build knowledge about how renewable and non-renewable resources are used for energy and their environmental impact in order to engage in a collaborative problem-solving project. The investigations and the problem-solving project are described below. It is important to note that every time students are exposed to new concepts and language; oracy and background knowledge are first developed (see Building Oracy and Background Knowledge).

Investigation 1: Students will gather and combine information from texts, videos, and other reliable sources to determine the difference between renewable resources and non-renewable resources. Students will collect the information in graphic organizers and categorize the information in their science notebooks.

Standards:
4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources, ~~and their uses affect the environment~~. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

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Click here to access the outcomes for these reading standards (pages 4-8).

As students engage in research, they may use texts such as:

- *Aprender sobre la energía eólica*
- *Aprender sobre la energía solar*
- *Aprender sobre la energía hidráulica*
- *Aprender sobre el carbón, el petróleo y el gas natural*
- *Los biocombustibles*
- *Hacia un mundo verde*
- *La energía a nuestro alrededor*

As a part of inquiry or to see a model or mentor text opinion essay, students may read informational articles such as:

- *4. Fuentes de energía pg. 6*
- *Conocimiento de energía*
- *Energía en los Estados Unidos datos de 2017*
- *Política de energía wiki*
- *Resumen para formuladores de políticas pg. 5*

Explicit reading instruction will include Comprehensive Literacy strategies and routines such as:

- Minilessons
- Modeled/Shared Reading
- Independent Reading & the Say Something or Write Something Strategy (p.95)
- Small group instruction, such as strategy groups
- One-on-one conferring
- Paired or partner reading
- Interactive Read Aloud

Examples:

- Modeled reading: The teacher models how to apply the skills of one or more standards in a text about renewable or non-renewable energy before asking students to apply the same skill to the same or a similar text **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10**

- **Click here to access the outcomes for this science standard.**

Example inquiry activities (by reading texts about the topic and writing notes about their findings):

- What are different types of renewable resources? How do humans use them for energy?
- What are different types of nonrenewable resources? How do humans use them for energy?

Students may use texts such as those listed below to gather information for this investigation:

- *Aprender sobre la energía eólica*
- *Aprender sobre la energía solar*
- *Aprender sobre la energía hidráulica*
- *Aprender sobre el carbón, el petróleo y el gas natural*
- *Los biocombustibles*
- *4. Fuentes de energía pg. 6*
- *Conocimiento de energía*

Prior to reading a text for inquiry, oracy is also developed on language that is unfamiliar to ensure comprehension. For example, the teacher may need to build oracy on the following terms found in these scientific texts used for student research.

- *Aprender sobre el carbón, el petróleo y el gas natural: las centrales eléctricas, el suministro energético, los hidrocarburos*
- *Aprender sobre la energía hidráulica: la*

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- Shared Reading: With the teacher, students collaboratively construct and read or read a comprehensible text about renewable or non-renewable energy together, applying the skills of a particular reading standard(s). **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10**
- Think aloud: In either a whole group or small group setting, the teacher models how to apply the skills of a particular reading standard(s) using a text about renewable or non-renewable energy by sharing the thinking aloud before students practice the same skill with the same of a different text **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10**
- Modeled writing: The teacher models how to show evidence of a reading skill from the standards in writing using a text about renewable or non-renewable energy before students apply the skill on their own **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10, W.4.9B**
- Shared writing: With the teacher, students collaboratively construct a written piece that illustrates the application of a reading skill from the reading standards using a text about renewable or non-renewable energy **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10, W.4.9B**
- Paired or partner reading- Student partnerships read a text about renewable or non-renewable energy, applying the skills of the reading standards **RI.4.1, RI.4.3, RI.4.4, RI.4.7, RI.4.10, W.4.9B**
- Interactive Read Aloud- After developing oracy and background knowledge, students demonstrate the TPR when they see/hear examples of events, procedures, ideas, or concepts in a scientific text. **RI.4.1, RI.4.4, RI.4.10**

Writing: Throughout this unit, students will engage in a variety of writing experiences to

- Gather and collect notes from inquiry and research (W.4.8 - please see content section to the right) about renewable and non-renewable resources, their uses, and the environmental impact of their use.
- Demonstrate the application of the skills of the reading standards while reading or after reading a text (W.4.9.B – please see reading comprehension above)
- Organize, draft, and revise a formal opinion essay (W.4.3)

Click here to access the outcomes for these Writing Standards (pg. 9-14)

radiación electromagnética, los rayos x, las celdas fotovoltaicas, el sistema solar térmico

Investigation 2: Students will gather and combine information from texts, videos, and other reliable sources to determine the environmental impact of the use of both renewable and non-renewable energy sources and the international, national, and local level. As with investigation 1, students gather information in graphic organizers and categorize the information in their science notebooks.

Standards: **4-ESS3-1** Obtain and combine information to describe ~~that energy and fuels are derived from natural resources~~, and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

Click here to access the outcomes for this science standard (pgs.1-4).

Example inquiry activities (by reading texts about the topic and writing notes about their findings):

- What would happen if we only used non-renewable resources?
  - Exploration of the loss of habitat due to an increase in mining and fracking.

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The varied writing experiences will incorporate the writing standards below:

- **W.4.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
    - Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose.
    - Provide reasons that are supported by facts and details.
    - Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition).
    - Provide a concluding statement or section related to the opinion presented.
- **W.4.4** Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- **W.4.6** With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.
- **W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.
- **W.4.10** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
- **Click here to access the outcomes for these writing standards.**

Explicit writing instruction will include Comprehensive Literacy strategies and routines such as:

- Modeled and shared writing
- Mini lessons
- Interactive Writing
- Independent writing
- Interactive proofreading, editing, and revising

    - Exploration into climate change and irreversible damage.
- What would happen if we did not consider all factors of an area before building a dam or adding wind turbines?
    - Exploration of contamination and added pollution from deteriorating materials when a dam begins to deteriorate under water.
    - Exploration of the impact on fish and bird migratory paths.
    - Exploration of how the noise impacts the local community, including animals.
- Guided/Shared Writing: After engaging in investigations of non-renewable energy sources and their uses, students will collaboratively gather relevant information and organize it in their graphic organizer or science notebook. **4-ESS3-1, W.4.4, W.4.8, W.4.10**
- Language Experience Approach (p. 57-59): The class collaboratively writes a text about the impact renewable and non-renewable energy sources have on the environment after reading a text or watching a video that illustrated various examples. **4-ESS3-1, W.4.4, W.4.8, W.4.10**

Students may use texts such as those listed below to gather information for this investigation:

- *Hacia un mundo verde*
- *La energía a nuestro alrededor*

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Examples:

- Minilesson: The teacher models how to apply a skill, such as organizing information from research notes to prepare for drafting an opinion essay. Then, the students apply their learning by using the same structure to organize information from their notes to prepare for writing their own opinion essay. **W.4.1, W.4.4, W.4.10**
- Interactive Writing: After identifying various examples of how different authors write an introductory paragraph, the students make suggestions for how to draft an introductory paragraph for an opinion essay, thus creating a collaboratively created text. **W.4.1, W.4.4, W.4.10**
- Modeled Writing: Using a Writer's Workshop structure, the teacher models how to identify and use examples of the language in a concluding statement in order to draft a concluding statement. Then, either in small groups, student partnerships, or independently, students look for examples of language in a concluding statement and apply it to their own opinion essay. **W.4.1, W.4.4, W.4.10**

Word Recognition: Foundational Skills, Language, and Fluency – The teacher delivers foundational skills and language instruction according to the systematic sequence adopted by the district's word recognition program, using data gathered from the unit's reading and writing activities to inform pacing and instructional grouping. Word recognition is taught within the meaningful context of the unit topic, utilizing familiar vocabulary and terms to exemplify and explicitly practice the skills outlined in the foundational skills and language standards. Instruction can be delivered in whole group, small group, or individually, depending on the needs of students.

For example, Reading Foundational Skills standards that can be addressed include:

- **RF.4.3** *Conocen y aplican la fonética y las destrezas de análisis de palabras a nivel de grado, en la decodificación de palabras.*
    - RF.4.3b *Distinguen palabras homófonas por su función y significado y reconocen el uso del acento diacrítico para distinguirlas*

- *Energía en los Estados Unidos datos de 2017*
- *Política de energía wiki*
- *Resumen para formuladores de políticas pg. 5*

Prior to reading a text for inquiry, oracy is also developed on language that is unfamiliar to ensure comprehension. For example, the teacher may need to build oracy on the following terms found in these scientific texts used for student research.

- *Los biocombustibles Por lo tanto, proviene, a pesar de que, poner en marcha, la contaminación, el medioambiente, los derrames de petróleo, perjudica*
- *Aprender sobre la energía eólica: las llanuras planas y abiertas, el cambio climático, la contaminación visual*

Collaborative Problem-Solving Project: Students will work in small groups to propose solutions for reducing their school's dependence on non-renewable energy. Each small group will identify and define a problem related to the school's use of non-renewable energy sources, identify a desire to reduce that dependence, and generate at least two possible solutions to address the problem. For example, one group may decide to focus on the fact that they school's heating system uses only non-renewable energy, identify by how much they want to reduce that dependency, and identify two plausible solutions to reduce the dependency on non-renewable energy to heat the school. The proposed

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○ RF.4.3e *Usan correctamente el acento escrito de acuerdo con el acento tónico en palabras apropiadas al nivel de grado aplicando un análisis sistemático:* ○ *Cuentan el número de sílabas.* ○ *Nombran la sílaba que lleva el énfasis (última, penúltima, antepenúltima).* ○ *Categorizan la palabra según su acento tónico (aguda, grave, esdrújula).* For example, Language standards that can be addressed include: • **L.4.2** *Demuestran, al escribir, dominio de normativas del español para el uso de las letras mayúsculas, signos de puntuación y ortografía.* ○ L.4.2g *Escriben correctamente palabras que contienen una relación entre fonemas y grafemas múltiples (b-v; c-s-z-x; c-k-qu; g-j; y-ll, r-rr) y letras mudas (H/h; u en las sílabas gue, gui, que, qui) en palabras a nivel de grado.* ○ L.4.2h *Reconocen que se emplea el acento ortográfico en todas las palabras esdrújulas y sobreesdrújulas.* Word recognition teaching strategies are used to work on these standards, asking students to apply them in their reading and writing and as they engage in inquiry: ● Mini lessons ● Dictado (p. 119, 126-129) ● Individual conferences ● Modeling through shared writing Examples: ● Mini lessons ● The teacher demonstrates how to identify a tonic syllable and how counting syllables helps identify words that require a written accent mark (*fósiles, eólica, atmósfera, científicamente)***. L.4.2h** ● Dictado (p. 119, 126-129) ○ *Segmentación silábica (e-ó-li-cos, u-ti-li-zan-do, ge-ne-ran)* **RF.4.3e1**	solutions will be collaboratively established constraints for cost, materials, and time, and limits for space, and impact on the environment. Using what they have learned from the previous two investigations, students will research and describe the possible effects of their proposed options. Completion of this project will demonstrate an understanding of the interdependence of science and technology and of the influence of science, engineering, and technology on society and the natural world (crosscutting concepts of 4-ESS3-1). For example, students can propose the installation of wind turbines on school property to generate energy for the school gym. The installation of the wind turbines would ensure minimal negative effects on the environment or the migratory paths of birds **(4-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2)**. This example proposal is an example of using science (concepts around developing renewable wind energy and concepts around the migratory paths of birds) and engineering practices (wind turbines that create energy while allowing birds to migrate) in a way that meets the needs of society. Students can investigate Lady Bird Johnson Middle School to observe how this school became the US's largest net zero school. **Standards: 3-5 ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3-5 ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	

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○ *Acentuación (eólicos, energía, más)* **RF.4.3e**	• **Click here to access the outcomes for these Engineering Design standards.**	
Performance-Based Summative Assessment - In the performance-based summative assessment for this unit, each student will use what they have learned about renewable and non-renewable sources of energy and the environmental impacts of their use in order to create a poster that illustrates the benefits and challenges of one specific energy source. For example, one student may want to illustrate the benefits of using moving water as an energy source. While mobbing water is a renewable source of energy and its use does not generate air pollution like coal, the dams that are built to harness the energy of moving water negatively impact the habitat of many aquatic plants and animals. Once completed, the posters can be posted around the classroom, and other classrooms can be invited to visit the "energy museum." The students can act as museum guides and provide additional information about their chosen energy source.		

COMPLETED SAMPLE Learning Plan for THIS Unit https://bit.ly/SLA_OurQuestforEnergyLP	
Day to Day Planning Template – English https://bit.ly/T4BLPT	
Day to Day Planning Template – Spanish https://bit.ly/T4BEP	
6-step Planning Framework for the Bridge https://bit.ly/BridgeFramework6Steps	
Sample Formative Assessment Templates https://bit.ly/Unit5FAs	

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<table>
<tr><th colspan="3">The Bridge</th></tr>
<tr><th>Bridge - Transfer
Side by Side

Steps 1, 2, 3, 4</th><th>Bridge – Transfer – Practice (includes Listening, Speaking, Reading, and Writing in the other language)
Step 6</th><th>Bridge: Contrastive Analysis

Step 5</th></tr>
<tr>
<td>
Set up the chart paper: Make a T-Chart and label the left side Español in green and the right-side English in blue.

Elicit key vocabulary from the students based on what they learned in the unit and from the concept attainment and write those words in the Español side of the chart.
Practice key vocabulary in English using the same TPR and images
Once students have engaged in the TPR to the point that oracy has been built in English and students have the academic language in English, the teacher leads the students in adding the English equivalent to the t-chart in blue.

Anticipated Bridge Chart for Content (Science):
<table>
<tr><th>Español</th><th>English</th></tr>
<tr><td>los recursos naturales</td><td>natural resources</td></tr>
<tr><td>las fuentes de energía renovable</td><td>renewable energy sources</td></tr>
<tr><td>las fuentes de energía no renovable</td><td>non-renewable energy sources</td></tr>
<tr><td>los paneles solares</td><td>solar panels</td></tr>
<tr><td>la energía solar</td><td>solar energy</td></tr>
<tr><td>el gas natural</td><td>natural gas</td></tr>
<tr><td>las turbinas eólicas</td><td>wind turbines</td></tr>
<tr><td>Los combustibles fósiles</td><td>fossil fuels</td></tr>
<tr><td>el agua</td><td>water</td></tr>
<tr><td>el carbón</td><td>coal</td></tr>
</table>
</td>
<td>

Students practice TPR in English- listening and speaking
Students practice TPR and read the Reduce, Reuse, Recycle reader’s theater with the teacher (or another reader’s theater)
Students practice reading the script in small groups using TPR
Students (in small groups or pairs) draft their own reader’s theater script using their newly learned English academic science words and phrases
With guidance from the teacher, students finalize their own reader’s theater script using their newly learned English academic science words and phrases.

</td>
<td>
Metalinguistic Skills: Possible area of focus includes:
Syntax & Grammar

Word Order (noun-adjective)
In Spanish- Adjectives usually go after the noun they are describing
In English- Adjectives go before the noun they are describing.

Possible Contrastive Analysis Chart:
<table>
<tr><th>Español
Sustantivo adjetivo</th><th>English – adjective noun</th></tr>
<tr><td>los recursos naturales</td><td>natural resources</td></tr>
<tr><td>los paneles solares</td><td>solar panels</td></tr>
<tr><td>la energía solar</td><td>solar energy</td></tr>
<tr><td>el gas natural</td><td>natural gas</td></tr>
<tr><td>las turbinas eólicas</td><td>wind turbines</td></tr>
<tr><td>Los combustibles fósiles</td><td>fossil fuels</td></tr>
<tr><td>Los conceptos explícitos</td><td>explicit concepts</td></tr>
<tr><td>Los conceptos implícitos</td><td>implicit concepts</td></tr>
<tr><td>El acento tónico</td><td>tonic accent</td></tr>
</table>
</td>
</tr>
</table>

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el aire	wind
el petróleo	oil

Anticipated Bridge Chart for Language Arts:

Español	**English**
Lo que dice el texto explícitamente	What the text says explicitly
Inferencias usando detalles y ejemplos del texto	Inferences made by using details and examples from the text
El acento tónico	tonic accent
La palabra aguda	word where the final syllable is stressed
La palabra grave	word where the penultimate syllable is stressed
La palabra esdrújula	word where the antepenultimate syllable is stressed
última	last final
penúltima	penultimate
antepenúltima	antepenultimate

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SAMPLE - Formative Assessment 1: Initial Oracy for Science Anecdotal Record Chart – SAMPLE

<table>
<tr><th>Standards</th><th colspan="6">Outcomes</th></tr>
<tr><td>4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</td><td colspan="6">A. Identify examples of natural resources.
B. Identify examples of energy and fuels that come from natural resources.
C. Identify examples of renewable energy sources.
D. Identify examples of non-renewable energy sources.

<table><tr><th>Sensory Supports</th><th>Graphic Supports</th><th>Interactive Supports</th></tr><tr><td>Pictures/images
Total Physical Response</td><td>T-chart (concept attainment)
Sentence Prompts</td><td>Whole group
Strategic partners</td></tr></table></td></tr>
<tr><td>Student name:</td><td>Identifies examples of natural resources by exhibiting receptive language (actions during TPR)</td><td>Demonstrates productive language by speaking words with TPR</td><td>Identifies examples of renewable and non-renewable energy sources by exhibiting receptive language (actions during TPR)</td><td>Demonstrates productive language by speaking words with TPR</td><td>Identifies examples of energy and fuels that come from natural resources by exhibiting receptive language (actions during TPR)</td><td>Demonstrates productive language by speaking words with TPR</td></tr>
<tr><td></td><td>los recursos naturales
la luz solar
el viento
el agua
la materia vegetal
el carbón
el petróleo
el gas natural</td><td>los recursos naturales
la luz solar
el viento
el agua
la materia vegetal
el carbón
el petróleo
el gas natural</td><td>las fuentes de energía renovables
no renovables
reponer</td><td>las fuentes de energía renovables
no renovables
reponer</td><td>el aparato o el mecanismo
captura
lo convierte
la energía
los paneles solares
las turbinas eólicas
la represa hidroeléctrica
la minería
La fábrica
la bomba de fracturación
extrae
un pozo
poner en marcha</td><td>el aparato o el mecanismo
captura
lo convierte
la energía
los paneles solares
las turbinas eólicas
la represa hidroeléctrica
la minería
la fábrica
la bomba de fracturación
extrae
un pozo
poner en marcha</td></tr>
</table>

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SAMPLE - Formative Assessment 2 Oracy Before Reading Specific Informational Texts Anecdotal Record Chart – SAMPLE

Standards	**Outcomes** (to be decided based on the needs of students and the planned activities)
RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.	E. Identify what a text says explicitly. F. Identify inferences that can be drawn from a text. G. Distinguish between what the text says explicitly, and inferences drawn from the text.
RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.	V. Identify concepts in a text.
Language Development Supports:	**Sensory Supports** / **Graphic Supports** / **Interactive Supports**

Student name:	Identifies examples of concepts in a text by exhibiting **receptive language** (actions during TPR)	Demonstrates **productive language** by speaking words with TPR	**Identifies** examples of what the text says explicitly.	**Identifies** examples of inferences that can be drawn from a text.	**Distinguishes** between what the text says explicitly, and inferences drawn from the text by exhibiting **receptive language** (actions during TPR)	Demonstrates **productive language** by speaking words with TPR
	Provienen *Biocombustibles* *Combustibles fósiles* *Queman* *Por lo tanto* *A pesar de que*	*Provienen* *Biocombustibles* *Combustibles fósiles* *Queman* *Por lo tanto* *A pesar de que*			*Lo que dice el texto explícitamente* *Una inferencia usando detalles y ejemplos del texto*	*Lo que dice el texto explícitamente* *Una inferencia usando detalles y ejemplos del texto*
	Provienen *Biocombustibles* *Combustibles fósiles* *Queman* *Por lo tanto* *A pesar de que*	*Provienen* *Biocombustibles* *Combustibles fósiles* *Queman* *Por lo tanto* *A pesar de que*			*Lo que dice el texto explícitamente* *Una inferencia usando detalles y ejemplos del texto*	*Lo que dice el texto explícitamente* *Una inferencia usando detalles y ejemplos del texto*

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