**NGSS 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.
* **3-5-ETS1-3.** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

**ELA Standards:**

**Informational Text**

* [CCSS.ELA-Literacy.RI.5.2](http://www.corestandards.org/ELA-Literacy/RI/5/2/)  
  Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
* [CCSS.ELA-Literacy.RI.5.4](http://www.corestandards.org/ELA-Literacy/RI/5/4/)  
  Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.
* [CCSS.ELA-Literacy.RI.5.5](http://www.corestandards.org/ELA-Literacy/RI/5/5/)  
  Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
* [CCSS.ELA-Literacy.RI.5.7](http://www.corestandards.org/ELA-Literacy/RI/5/7/)  
  Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
* [CCSS.ELA-Literacy.RI.5.9](http://www.corestandards.org/ELA-Literacy/RI/5/9/)  
  Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

**Writing**

* [CCSS.ELA-Literacy.W.5.7](http://www.corestandards.org/ELA-Literacy/W/5/7/)  
  Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
* [CCSS.ELA-Literacy.W.5.8](http://www.corestandards.org/ELA-Literacy/W/5/8/)  
  Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
* [CCSS.ELA-Literacy.W.5.9](http://www.corestandards.org/ELA-Literacy/W/5/9/)  
  Draw evidence from literary or informational texts to support analysis, reflection, and research.

**Speaking and Listening**

* [CCSS.ELA-Literacy.SL.5.1.d](http://www.corestandards.org/ELA-Literacy/SL/5/1/d/)  
  Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* [CCSS.ELA-Literacy.SL.5.2](http://www.corestandards.org/ELA-Literacy/SL/5/2/)  
  Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
* [CCSS.ELA-Literacy.SL.5.3](http://www.corestandards.org/ELA-Literacy/SL/5/3/)  
  Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
* Presentation of Knowledge and Ideas:
* [CCSS.ELA-Literacy.SL.5.4](http://www.corestandards.org/ELA-Literacy/SL/5/4/)  
  Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

**Math Standards:**

* CCSS>Math - 4.MD.1 Units within a system of measurement and 5.MD.1 Conversion of units (Temperature and Elapsed Time)

**Content and Language Objectives:**

* *I can explain using appropriate vocabulary the job of a green engineer and give examples of how they design technology with the environment in mind.*
* *I can discuss how the events in the story relate to the engineering design process.*
* *I can explain the problem and solution in the story.*
* *I can write or sketch a short description of each step in the Engineering Design Process.*
* *I can gather and summarize information about a topic and make connections across multiple texts and media.*

**Scope and Sequence:**

***PREPARATORY LESSON FOR ALL EIE KITS: SEE “Technology in a Bag” Template***

**Lesson 1** – Building Background

|  |  |  |
| --- | --- | --- |
| **DE/Techbook:**  **\*\*\*To use DE Hyperlinks, you must first log into BPS DE or right click to copy the url\*\*\***  [Understanding Solar Energy](http://app.discoveryeducation.com/player/view/assetGuid/72849902-271f-4735-b99f-c419a9f6f0bf)  [Thermal Energy Animation](https://app.discoveryeducation.com/player/view/assetGuid/1363cd15-0f71-4733-9135-88c2208bc6f0)  [Conductors and Insulators](http://app.discoveryeducation.com/player/view/assetGuid/a6244443-6ee0-4f77-a868-d7db49e54266?)  [Convection](http://app.discoveryeducation.com/player/view/assetGuid/a6244443-6ee0-4f77-a868-d7db49e54266?)  [Radiation and the Sun](http://app.discoveryeducation.com/player/view/assetGuid/a6244443-6ee0-4f77-a868-d7db49e54266?) | **ELA Resources**   * Read Aloud: EIE - Lerato Cooks Up A Plan * Reach: Unit 2 Big Question: What is the power of the sun? * Make Some Sun Tea p.78 * Key Words p.79 * Leveled Reader Lexile 790: The Kids Solar Energy Book | **Additional Resources:**  [Testing and Logging Insulators](http://www.bbc.co.uk/schools/scienceclips/ages/8_9/keeping_warm_fs.shtml)  [FAQs about solar cooking](http://www.solarcooker-at-cantinawest.com/solarcookingfaq.html) |

**Lesson 2 – CORE** – \*\*NOTE\*\* Lesson 2 in the EIE kit is about the creation and recycling of paper and not useful to a discussion of solar power in the 5th grade

**Lesson 3 - CORE**

|  |  |  |
| --- | --- | --- |
| DE/Techbook  [How Big Is Your Footprint? Lab](https://app.discoveryeducation.com/player/view/assetGuid/f78ab963-6905-4b3c-bbe1-ced4b5ff3029) | ELA Resources   * Reach Explorer: Star Power (Powered By The Sun chapter on solar arrays (Lexiles 550 and 880) * Leveled Readers: * World Solar Challenge (ELL version) * Alternative Energy: Beyond Fossil Fuels: Solar Energy (pg.12 -18) | Additional Resources |

**Lesson 4 – ENRICH / DESIGN**

|  |  |  |
| --- | --- | --- |
| DE/Techbook  [Project: Design a Solar Oven](https://app.discoveryeducation.com/learn/techbook/units/7BFE9EA9-A09A-4F71-8872-649B31A3F04F/concepts/14C24CF3-4C61-4438-9910-59910EF51B79/tabs/054D49D8-D8F5-4203-B276-19E25B56CC5F/pages/AA0C235B-4BC0-48DD-BC7B-766CD9F5D4DA?assetGuid=defbad8e-3819-490d-84b4-1c55a88e64bb%23cit--defbad8e-3819-490d-84b4-1c55a88e64bb)  [Hand-On Lab : Baking in the Sun](https://app.discoveryeducation.com/player/view/assetGuid/bf2b5875-b773-4602-a667-2d3f2607be5d) | ELA Resources  Reach | Additional Resources:  [Energy engineering](http://www.sciencebuddies.org/science-engineering-careers/engineering/energy-engineer)  [Design types for solar cookers](http://solarcooking.org/plans/)  [Solar Cooker](http://www.gosunstove.com/)  [Making S'mores in a solar oven](http://climatekids.nasa.gov/smores/) |

|  |  |
| --- | --- |
| Reading Tiered Vocabulary | |
| **T1 Common** | palm fronds, weave/wove, thatched, local, observation, materials, available, goal |
| **T2 General Academic** | impact, dispose, resources, minimize, energy, transfer, absorbs |
| **T3 Domain Specific** | environment, pollution, thermal, conductor, sustainable, reflector, insulation, “green”, solar, life cycle assessment (glossary) |
| **Multicultural** | rondavel, tikologo, maize porridge, Botswana, Nata |
| **For ELLs** | WORD LEVEL: squat (short), dorm, stern, fetching, squinted, scanning, gazing, shifted, ladle, protested  EXPRESSION LEVEL: picked up her pace, stopped short |

|  |  |
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| Design Phase Tiered Vocabulary | |
| **T1 Common** | improve, combination, |
| **T2 General Academic** | record (data), engineer (noun/verb) |
| **T3 Domain Specific** | insulation, “green”, thermometer, temperature, thermal, solar |
| **For ELLs** | seal (close), foil, crumple, shred, layer, duct tape |

**Focus Wall Words**

|  |
| --- |
| **Tier 1** |
| local |
| thatched |
| goal |
| materials |
| problem / solution |
|  |
| observation |
| improve |
| combination |
| weave/wove |
|  |
| **Tier 2** |
| energy |
| impact |
| dispose |
| (noun) engineer (verb) |
| resources |
| technology |
| environment |
| minimize |
| transfer |
|  |
| absorbs |
| (noun) record (verb) |
| thermometer |
| temperature |
|  |
|  |

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| --- |
| **Tier 3** |
| environmental engineer |
| pollution |
|  |
| “green” |
| thermal |
| conductor |
| reflector |
| insulation |
| sustainable |
| solar |
| life cycle assessment |

**Botswanan Words, Phrases, Concepts**

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| --- |
| Botswana and Nata |
| rondavel |
| tikologo |
| maize porridge |
|  |
|  |
| palm fronds |
|  |

***Essential Question***

***Essential Question***

How and why do we perform a life cycle assessment?

**Content and Language Objectives:**

* *I can explain the job of an electrical engineer and give examples of how they design and improve technology with electricity using appropriate vocabulary.*
* *I can discuss how the events in the story relate to the engineering design process.*
* *I can explain the problem and solution in the story.*
* *I can write or sketch a short description of each step in the Engineering Design Process.*
* *I can gather and summarize information about a topic and make connections across multiple texts and media.*
* *I can describe the circuit I built using appropriate vocabulary.*