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| **Lesson Plan Template** | |
| **Teacher:** | Stansberry |
| **Grade/Subject:** | 2nd Grade |
| **Course Unit:** | Wind Energy |
| **Lesson Title:** | Building a Wind Turbine |

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| **LESSON OVERVIEW** | Summary of the task, challenge, investigation, career-related scenario, problem, or community link |
| Students will read a story about wind energy and discuss how we can use wind turbines to capture and turn wind into energy for electricity. They will also watch a short film about how a wind turbine works. The students will discuss using renewable resources versus non-renewable resources to produce electricity. They will observe how the wind turbine will work. Then working with their team using the Engineering Design Process design blades that will catch the wind and turn. They will collect data of voltage being produced from their blades. | |

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| **STANDARDS** | Identify what you want to teach. Reference State, Common Core, ACT College Readiness Standards and/or State Competencies. |
| GLE 0207.Inq.3 Explain the data from an investigation.  GLE 0207.T/E.2 Apply engineering design and creative thinking to solve practical problems.  GLE 0207.7.3 Differentiate between renewable and non–renewable resources. | |

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| **OBJECTIVE** | Clear, Specific, and Measurable – NOT ACTIVITIES  Student-friendly |
| Students will explore how to use renewable resources like the wind to harness electricity. They will then design a wind turbine that will produce the most voltage. | |

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| **INTRODUCTION** | Should Include: Any prior knowledge that the students need to complete the lesson, approximately how long the lesson is predicted to take (Ex. 1 Day or 2 Days), and a short summary of the entire lesson plan. |
| The students will first discuss renewable versus non-renewable resources. The teacher and students will then specifically discuss how wind can produce electricity. The students will learn about the components of a wind turbine and then in their teams, they will construct the blades of a turbine. As the wind (fan) is applied to their blades, the students will measure the voltage that their turbine produced.  (3 or 4 days at 45 minutes each) | |

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| **MATERIALS LIST** | A bullet list of materials.  The materials need to be specific and include quantities |
| Book: “The Boy Who Harnessed the Wind”  Youtube video: Energy 101:Wind Turbines  Multimeter  2 wind turbine stands  20 hubs  60 dowels  Paper plates  Fabric  Tissue paper  Aluminum foil  Tape/glue | |

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| **RESOURCES** | Should Include: A bullet list of any links to videos, names of worksheets, names of projects, names of PowerPoints, links to online articles, links to interactive websites, names of reading materials, etc (All worksheets, PowerPoints, projects, and reading materials should be attached to the back of the lesson plan).  Specify whether they will be used before, during, or after the lesson. |
| <http://www1.eere.energy.gov/education/pdfs/wind_basicpvcwindturbine.pdf>  - These are the plans to build the base of the wind turbine.  <https://www.youtube.com/watch?v=sDXAf_p5FjU>  - The book being read “The Boy Who Harnessed the Wind”  <https://www.youtube.com/watch?v=tsZITSeQFR0>  - The video of Energy 101: Wind Turbines, This will help the students understand how wind turbines are suppose to work. | |

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| **ACTIVATING STRATEGY** | Motivator / Hook  An Essential Question encourages students to put forth more effort when faced with complex, open-ended, challenging, meaningful and authentic questions. |
| How would you like to be an engineer beginning at $73,000 working with the wind? You could become a wind energy engineer! You have to create a wind turbine to produce electricity for Knoxville so we can have food and water!! | |

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| **INSTRUCTION** | Step-By-Step Procedures – Sequence  Discover / Explain – Direct Instruction  Modeling Expectations – “I Do”  Questioning / Encourages Higher Order Thinking  Grouping Strategies  Differentiated Instructional Strategies to Provide Intervention & Extension |
| The teacher and students will begin discussing using renewable resources versus non-renewable to produce electricity. What are the benefits of using renewable resources? The teacher will then read the story “The Boy Who Harnessed the Wind”. The teacher and students will discuss the story of how William made electricity and water for food for his village. Do you think we can use wind energy here in Knoxville? The teacher will then show the short video of how wind turbines work on Youtube. The teacher and students will then discuss how we get electricity from the wind. The teacher will show the base of the wind turbine with the plastic blades and how the fan will turn the blade to produce voltage. The teacher will show the voltage meter and the amount of voltage the plastic blades put out. The teacher will show the students the hub with which they will make their blades in their team. The students will have a choice of materials they wish to make their blades making sure they are same weight and size. The teacher will walk around and monitor as the student teams work together producing the blades for the turbine. | |

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| **GUIDED & INDEPENDENT PRACTICE** | “We Do” – “ You Do”  Encourage Higher Order Thinking & Problem Solving  Relevance  Differentiated Strategies for Practice to Provide Intervention & Extension |
| The students will discuss how they would like their blades to look (size, shape, number, material). The students will have their plan page to draw/label their diagram. The teams will then use this diagram to create the blades. Once they are satisfied with what they made, they will come to the wind turbine base, attach their hub and test their blades. They will then record the voltage being produced. If they are not producing any volts, they are to go back and redesign their blades to be able to at least produce 0.4 volts. | |

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| **CLOSURE** | Reflection / Wrap-Up  Summarizing, Reminding, Reflecting, Restating, Connecting |
| The students will share what they created and report what they learned from the project. They will discuss how this would help in decreasing the use of non-renewable resources for electricity. | |

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| **ASSESSMENT /**  **EVALUATION** | Students show evidence of proficiency through a variety of assessments. Aligned with the Lesson Objective  Formative / Summative  Performance-Based / Rubric  Formal / Informal |
| The students will be assessed through the rubric discussed. This will include how they worked in their teams and whether their wind turbine worked. | |

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| **CITATIONS** | Any websites that were used to gather information. |
| <http://www1.eere.energy.gov/education/pdfs/wind_basicpvcwindturbine.pdf>  <https://www.youtube.com/watch?v=sDXAf_p5FjU>  <https://www.youtube.com/watch?v=tsZITSeQFR0> | |

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| **NOTES:** | Purchasing information for non-typical items  Tips & Tricks that may help |
| The teacher has assigned the different teams using a random pick of girls and boys. The teacher is sure to guide the students into thinking for themselves and not giving them the answer. This is very frustrating for the students but it becomes very satisfying to them when they figure out what needs to be done to make their turbine work. | |