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| Unit Title: | Wind Energy, Commercial and Residential |  | Grade: | 8-12 |

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| Learning Styles: | All students have different learning styles, and we are using a mixture, based on seven recognized learning styles: Visual, Aural, Verbal, Physical, Logical, Social and Solitary. We believe this module incorporates different learning styles and that vicarious learning on the part of a student is critical for growth. Learning styles in this module include:  •Visual: Pictures and images used  •Verbal: Words to help convey meaning  •Social: Students should discuss |
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| Unit Description: | This unit will enumerate the uses of wind for electrical generation. It will also introduce common terms involving residential and light commercial, and large-scale wind turbines. The lessons will explore systems controls and different design considerations. |
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| Instructional Objectives: | The curriculum is designed to achieve the following objectives for each individual area.  Residential Wind  1. Yaw and Furl  2. HAWT and VAWT  3. Basic controls  4. Efficiency and losses  5. Average wind speed  Commercial Wind  1. HAWT and VAWT  2. Wind quality  3. Power in the wind  4. Basic utility connection  5. Generation |
| Estimated Time: | 4-8 hours depending on students. |
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| Teaching Strategies: | Lecture: Present materials in a structured manner.  Active Learning: Promote active learning and critical thinking in discussion. Seek from students in discussion real-life applicability for the use of renewable energy resources and the concepts provided. |
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| Assessments: | At the end of each power point have the students answer questions based on the power point. At the end of the module create an assessment combining the two power points which the student can demonstrate basic knowledge of the subject. The assessment should be based upon discussions. |
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| Instructional Outcomes: | The outcome for this unit include:  1. The student will define wind energy for residential systems  2. The student will discuss energy losses in residential systems.  3. The student will define key terms for residential wind systems.  4. The student will summarize the use of furling tail.  5. The student will explain energy transfer in wind systems.  6. The student will explain the components of a commercial turbine  7. The student will discuss generation in a turbine.  8. The student will describe the siting procedure.  9. The student will define wind quality.  10. The student will discuss operational characteristics. |

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