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|  | **STAGE 2 – Scientific Studies (STEM)** |
| Task TitleIndividual Inquiry Design Proposal – Factors Impacting Wind Turbine Design |
| TeacherMr Loader | Year LevelYear 12 (Stage 2) | Due Date |



# Task Introduction

South Australia is global leader when it comes to renewable power generation. For many years the majority of our electricity generation has come from renewable resources. By far the largest contributor to this has been wind power. In the Port Augusta region we have had wind turbines installed at the Port Augusta Renewable Energy Park, and also at Lincoln Gap.

Although they seem quite simple, there are a lot of factors that influence the design of wind turbines and getting all of these factors right ensures that maximum power can be extracted from the wind that blows. Like any other engineered design all the possible variables are identified, isolated, and undergo scientific testing optimising a complex system by optimising the parts and processes that it consists of. This is key to the scientific method and engineering design process

In this task you will take on part of that role, you will do this by designing an investigation to optimise one of the variables. This task is a preliminary task that looks at designing an investigation that you will conduct at a later stage. The aim of the task is to deconstruct the problem, identify a research question, and design a method of investigation

# Task Requirements

In this individual inquiry there are many aspects related to wind turbine that can be selected to investigate. For the purposes of this task, and your individual inquiry, **you will select one factor to investigate, each member of the class must investigate a different factor.**

In readiness for your external assessment, you will individually prepare a proposal for a practical scientific investigation into a factor that influence the effectiveness of wind turbines. The proposal will form the basis of Assessment Type 3: Individual Inquiry. You will use the scientific method to obtain primary data.

The design proposal includes:

* a statement of an investigable question or hypothesis
* a deconstruction of the problem
* an appropriate method designed to obtain primary data
* a justification of the plan of action

You are encouraged to be innovative and ambitious in your inquiry and understand that the risk of an unexpected outcome is not a failure but an inherent part of scientific investigation.

The proposal could take the form of, for example:

* a concept map
* flow charts
* a science grant application.

You will be provided with feedback on your design proposal. Any improvements made as a result of the feedback should be reflected in the final report for Assessment Type 3: Individual Inquiry. You should not begin to work on this individual inquiry until this task is finished, and the feedback received is acted upon where necessary.

# Assessment Conditions

* The length of this design proposal should be a maximum of 4 x A4 pages.
* **The final report will be submitted electronically**. You must submit your full report electronically using the following naming protocol:

*SACE registration number-2STU20-AT1-Design Proposal*

# Performance Standards for Stage 2 Scientific studies 2023

| - | Investigation, Analysis, and Evaluation | Knowledge and Application |
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| A | Critically deconstructs a problem and designs a logical, coherent, and detailed scientific investigation, using a scientific method and/or engineering design process.Obtains, records, and represents data, using appropriate procedures, conventions, and formats accurately and highly effectively.Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.Critically and logically evaluates procedures and their effect on data.Critically and perceptively evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates deep and broad knowledge and understanding of a range of science inquiry skills and scientific concepts.Applies science inquiry skills and scientific concepts highly effectively in new and familiar contexts.Critically explores and understands in depth the interaction between science and society.Communicates knowledge and understanding of scientific concepts coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear scientific investigation, using a scientific method and/or engineering design process.Obtains, records, and represents data, using appropriate procedures, conventions, and formats mostly accurately and effectively.Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.Logically evaluates procedures and their effect on data.Critically evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates some depth and breadth of knowledge and understanding of a range of science inquiry skills and scientific concepts.Applies science inquiry skills and scientific concepts mostly effectively in new and familiar contexts.Logically explores and understands in some depth the interaction between science and society.Communicates knowledge and understanding of scientific concepts, with mostly coherent and effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear scientific investigation, using a scientific method and/or engineering design process.Obtains, records, and represents data, using generally appropriate procedures, conventions, and formats, with some errors but generally accurately and effectively.Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.Evaluates procedures and some of their effect on data.Evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates knowledge and understanding of a general range of science inquiry skills and scientific concepts.Applies science inquiry skills and scientific concepts generally effectively in new or familiar contexts.Explores and understands aspects of the interaction between science and society.Communicates knowledge and understanding of scientific concepts, with generally effective use of appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a scientific investigation using a scientific method and/or engineering design process.Obtains, records, and represents data, using procedures, conventions, and formats inconsistently, with occasional accuracy and effectiveness.Describes data and undertakes some basic interpretation to formulate a basic conclusion.Attempts to evaluate procedures or suggest an effect on data.Attempts to evaluate the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates some basic knowledge and partial understanding of science inquiry skills and scientific concepts.Applies some science inquiry skills and understanding of scientific concepts in familiar contexts. Partially explores and recognises aspects of the interaction between science and society.Communicates basic scientific information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a scientific investigation, using a scientific method and/or engineering design process.Attempts to use some procedures and record and represent some data, with limited accuracy or effectiveness.Attempts to describe results and/or interpret data to formulate a basic conclusion.Acknowledges that procedures affect data.Acknowledges the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates limited recognition and awareness of science inquiry skills and/or scientific concepts.Attempts to apply science inquiry skills and understanding of scientific concepts in familiar contexts.Attempts to explore and identify an aspect of the interaction between science and society.Attempts to communicate information about science. |