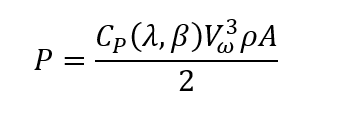
WIND TURBINE - Catherine

Our aim is to create an energy efficient power generation system that will work at a consistent rate and supply cheap and reliable power to the pump.  
Since the power produced by our wind turbine design is based on the equation:



Our goal was to find a tip speed ratio (lambda) and pitch angle (beta) that would maximise the power coefficient (Cp) for our blade design.A larger power coefficient (larger Cp) means a more efficient wind turbine blade. Designing a wind turbine blade that maximises the power coefficient allows us to meet the power requirements of the pump system while minimising the size of the system and the wind turbine’s effect on the surrounding environment.

Our first step in approaching this design module was to determine a maximum power coefficient for a fixed pitch angle on the experimental rig during different wind speeds. From there we had an idea of how the tip speed ratio affected the efficiency of a wind turbine blade. In the workshop after that, we varied the pitch angle as well to observe the changes in the power coefficient. The data we obtained from these experiments

At the time we were still working on our own wind turbine design, so we are temporarily using data for the workshop blades. Our calculations are currently based off the maximum Cp we obtained in the workshop, as a rough estimate.

Based on our current data and the power required by the pump, we have decided on a wind turbine blade of radius 12 m, which would make approx. 18 RPM and produce 2963W of power, assuming a yearly average wind speed of 5.47 m/s.

The amount of power generated by the wind turbine varies greatly depending on the wind speed. If the wind speed is slightly slower at 4 m/s, the turbine can only produce \_\_\_ W and will not be able to power the pump. However, with a wind speed of \_\_\_, the turbine can produce \_\_\_ W.