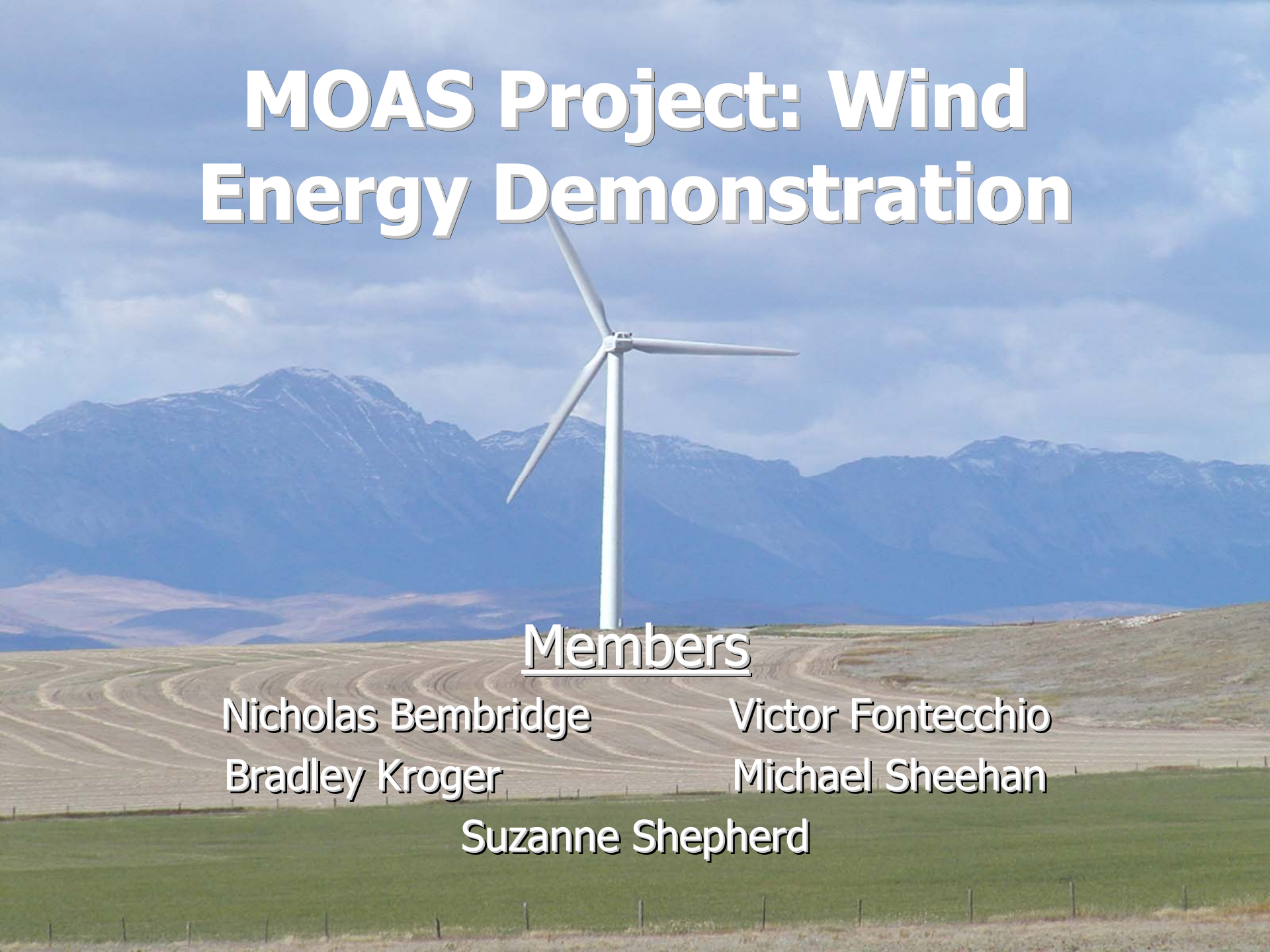

MOAS Project: Wind Energy Demonstration

Members

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Outline

- Project Definition
- Concept Generation
- Concept Selection
- Component Selection
- Final Design Specifications
- Budget Analysis
- Future Work

Project Definition

- The Mary Brogan Museum of Arts and Sciences (MOAS) is adding new exhibits showcasing alternative energy sources
- Our group was given the challenge of designing an exhibit for the museum that would educate the public about wind as an alternative energy source

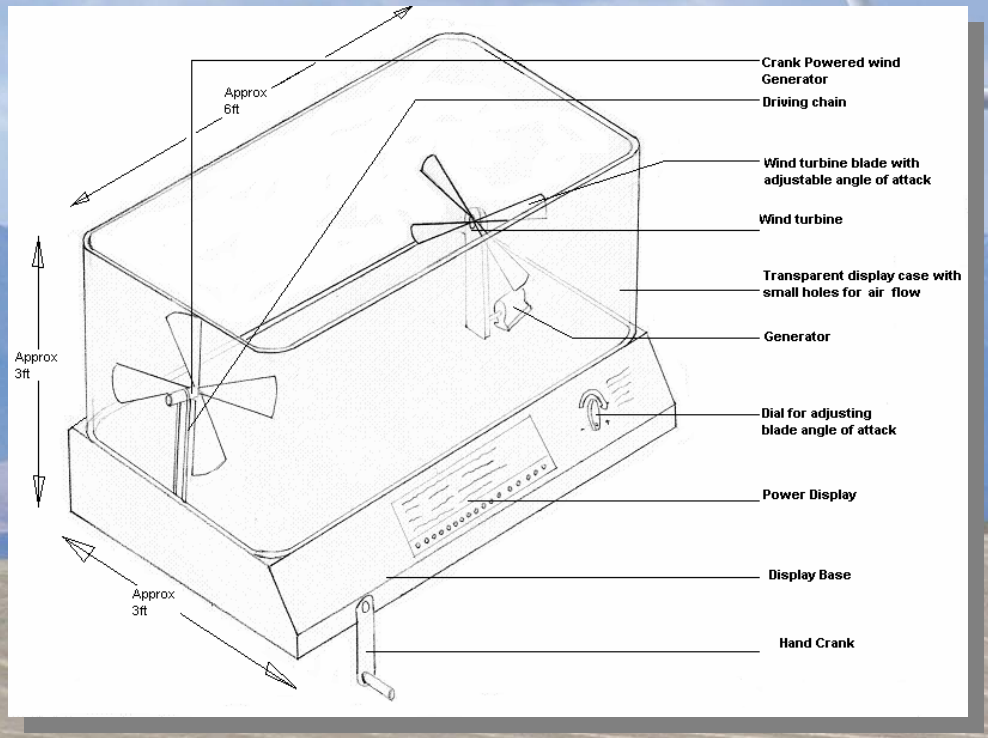
Exhibit Expectations

- Child friendly
- Entertaining for all ages
- Durable
- Interactive
- Visually Appealing
- Safe
- Budget
- Project must be completed by April

Concept Generation

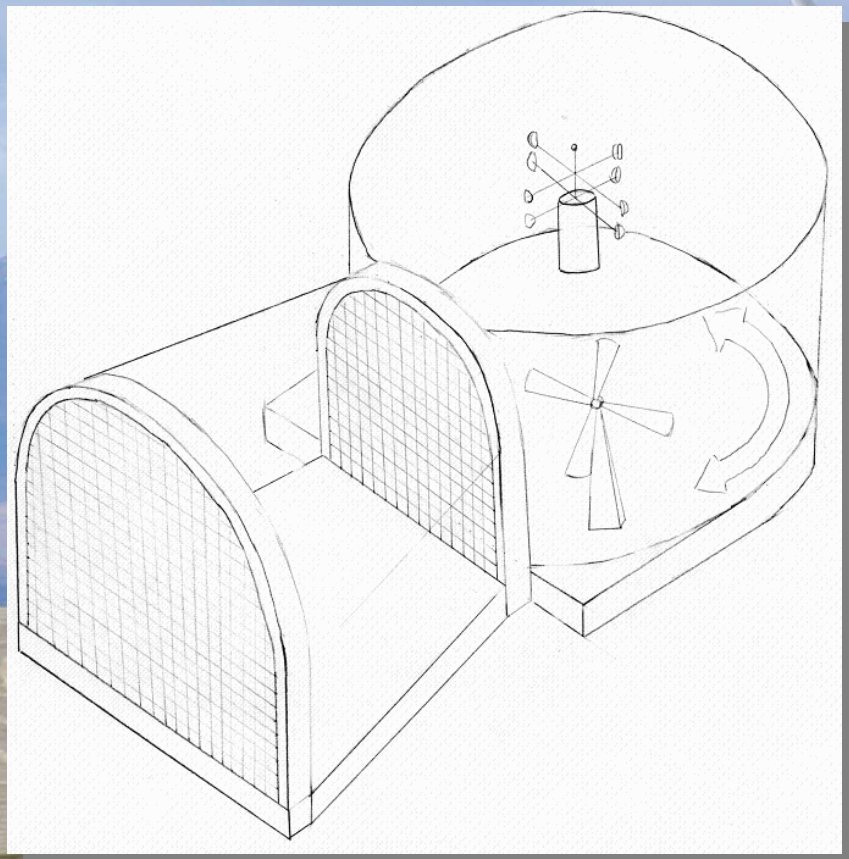
- Before reaching a final design for the exhibit, it went through many iterations
- Ideas and suggestions came from both our sponsors as well as from group members

1st Concept



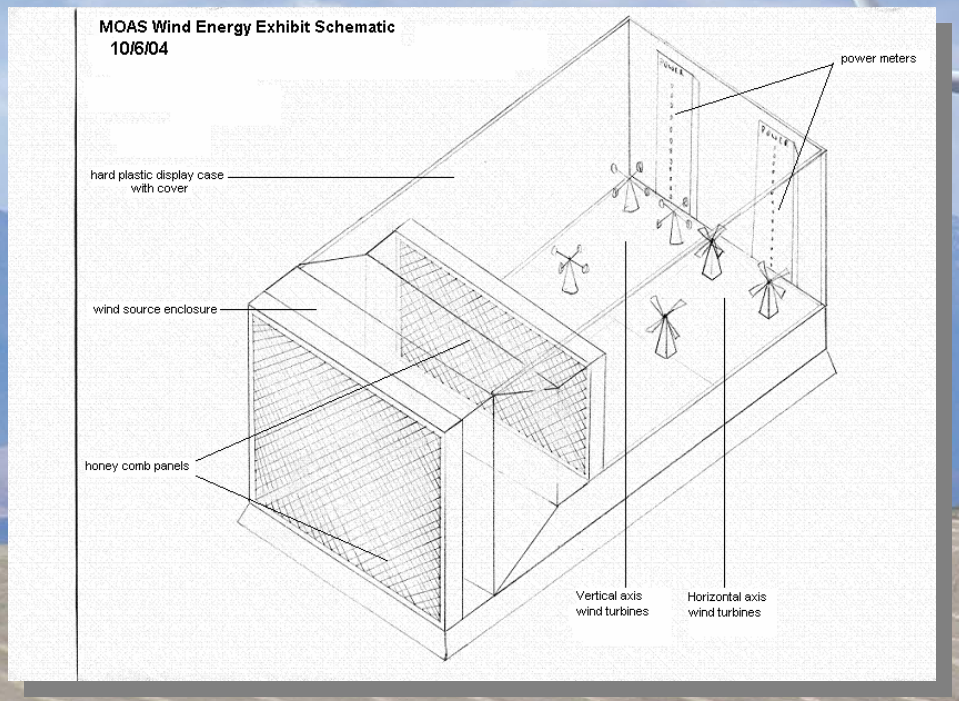
- Pros
  - Power Meter
  - DC Motor as power generator
  - Adjustable wind velocity
  - Visibility
- Cons
  - Hand Crank
  - Only one type of wind turbine

2nd Concept



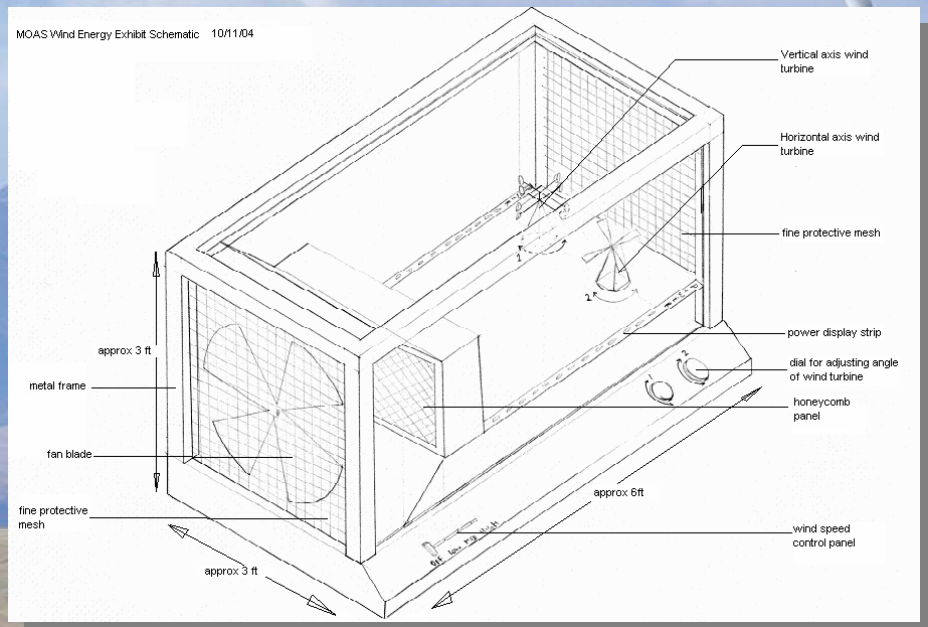
- Pros
  - Multiple Wind Turbines
  - Variable Angle for wind turbines
  - Flow Control
- Cons
  - No Exit for the Air Stream
  - Expensive Round Plastic Casing

3rd Concept



- Pros
  - Power Meters
  - Flow Control
  - Multiple Wind Turbines
  - Visibility
- Cons
  - No Exit for the Air Stream
  - Complex wiring for multiple turbines
  - Unable to vary the wind stream attack angle

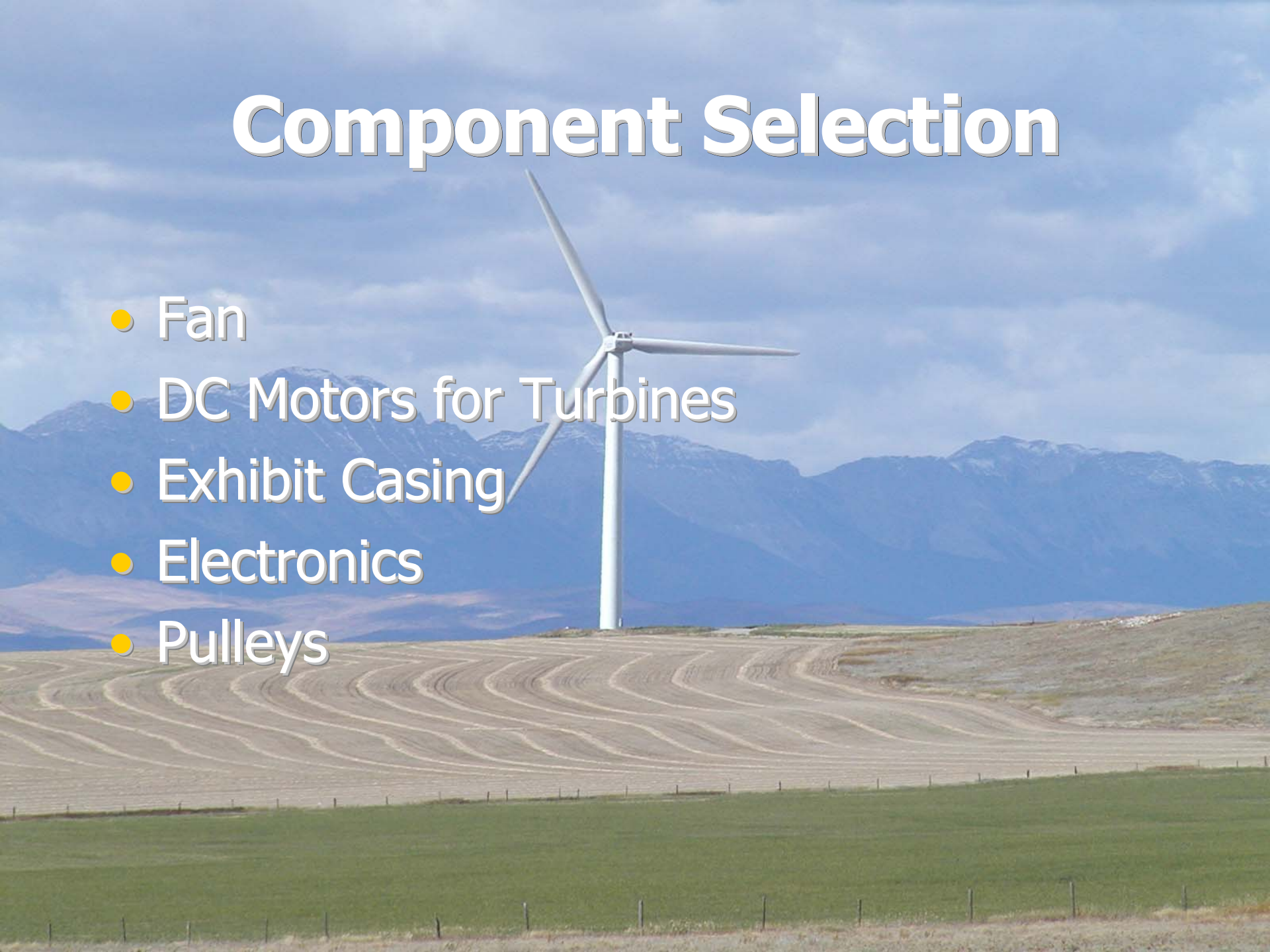
4th Concept



- Pros
  - Multiple Wind Turbines
  - Variable Angle Of Attack
  - Power Meters
  - Flow Control
- Cons
  - Limited Visibility due to metal casing

This became the final design concept

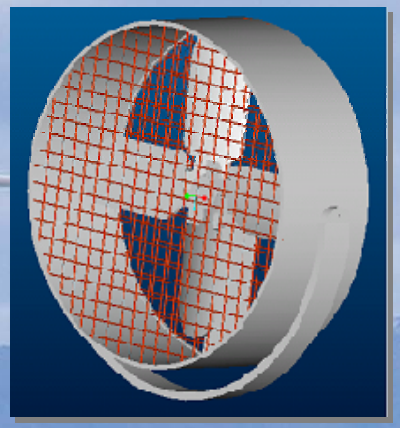
Component Selection



- Fan
- DC Motors for Turbines
- Exhibit Casing
- Electronics
- Pulleys

Wind Generation Selection

- To create a wind stream in the exhibit an electric fan needed to be selected.



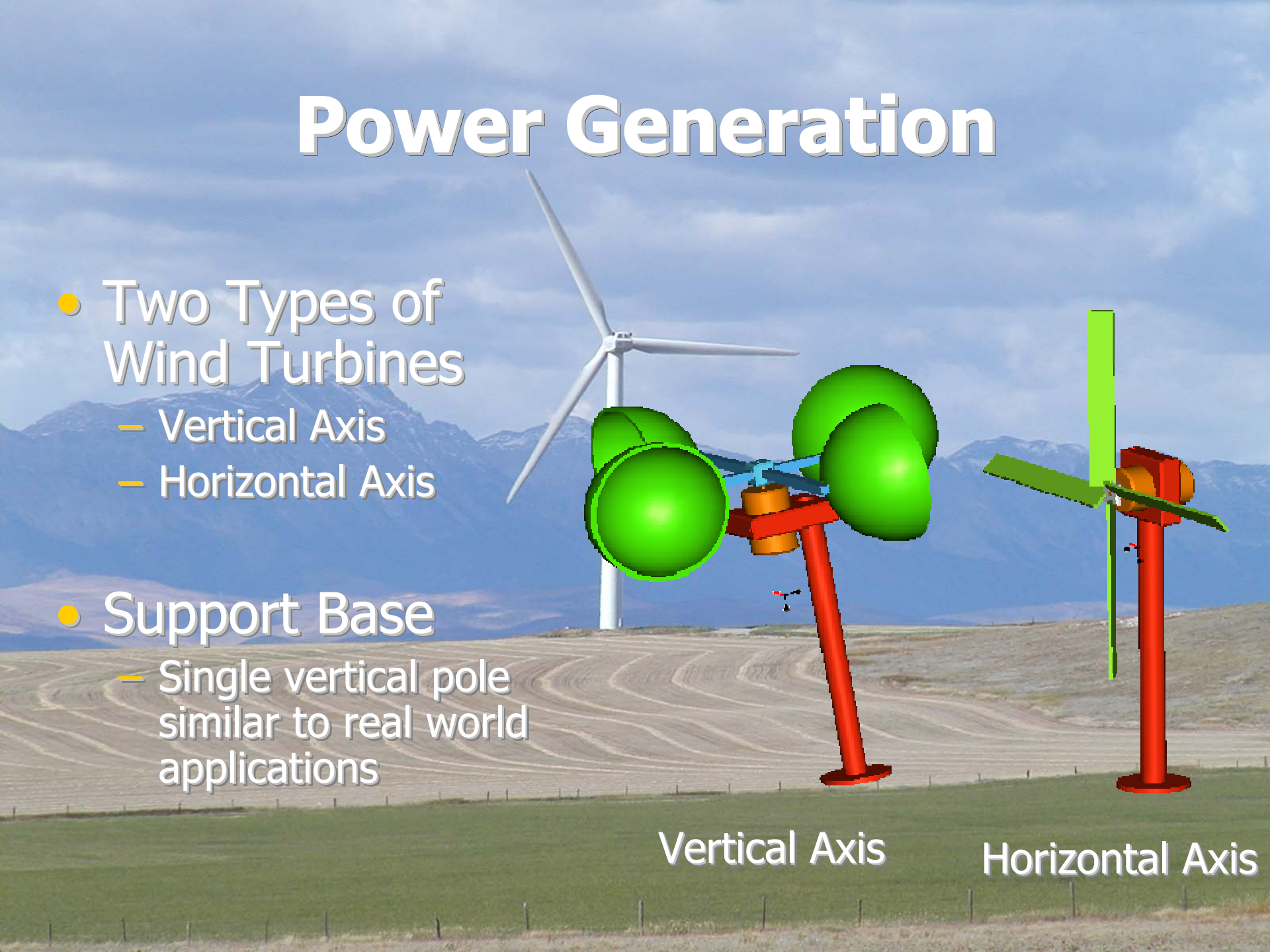
- Qmark LDC20 - 20” fan
  - 3 speeds
  - 110V wall source compatible

Power Generation Selection

- We were unable to find wind turbines on such a small scale, there for the turbines must be custom built
- Many of the parts needed to construct the wind turbines can be purchased at Hobby Town USA, and from McMaster

Power Generation

- Two Types of Wind Turbines
  - Vertical Axis
  - Horizontal Axis
- Support Base
  - Single vertical pole similar to real world applications

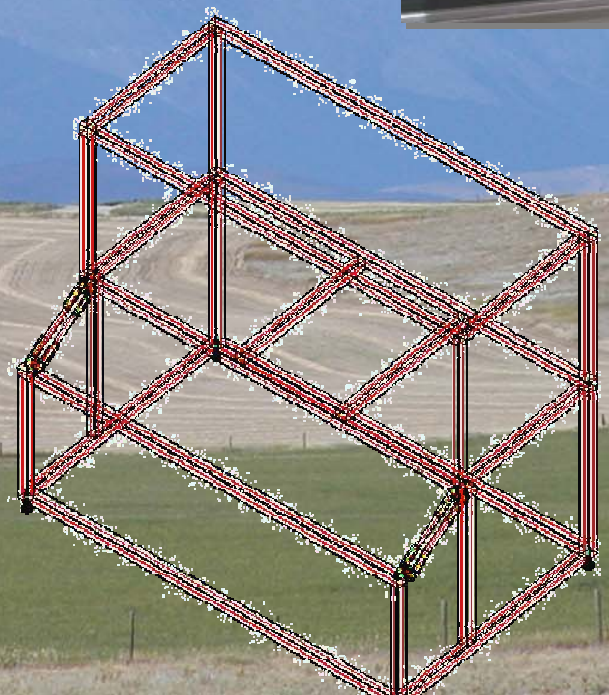


Vertical Axis

Horizontal Axis

Exhibit Casing Selection

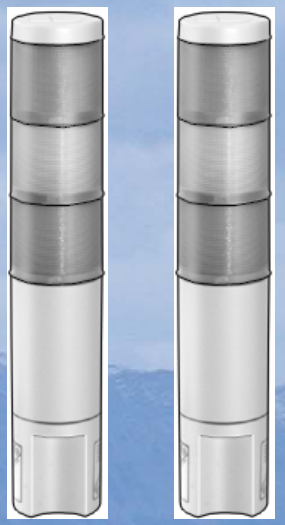
- 80/20 – Aluminum Frame Manufacturer
  - Extruded Aluminum Modular Frame
  - Clear Polycarbonate Sheets to Fill the Openings and Provide an Unobstructed View to the Exhibit
  - Adjustable Leveling Feet
  - PVC Coated Wire Mesh, covers end openings allowing air to enter and exit exhibit



Electronics Selection

- Purchasing Light Towers from McMaster
- GT Electric will build circuits that will run the light towers from the DC motors
- Hot Wire Anemometer to display the wind speed
- Kill Switch that will turn off the the fan, a specification of the museum

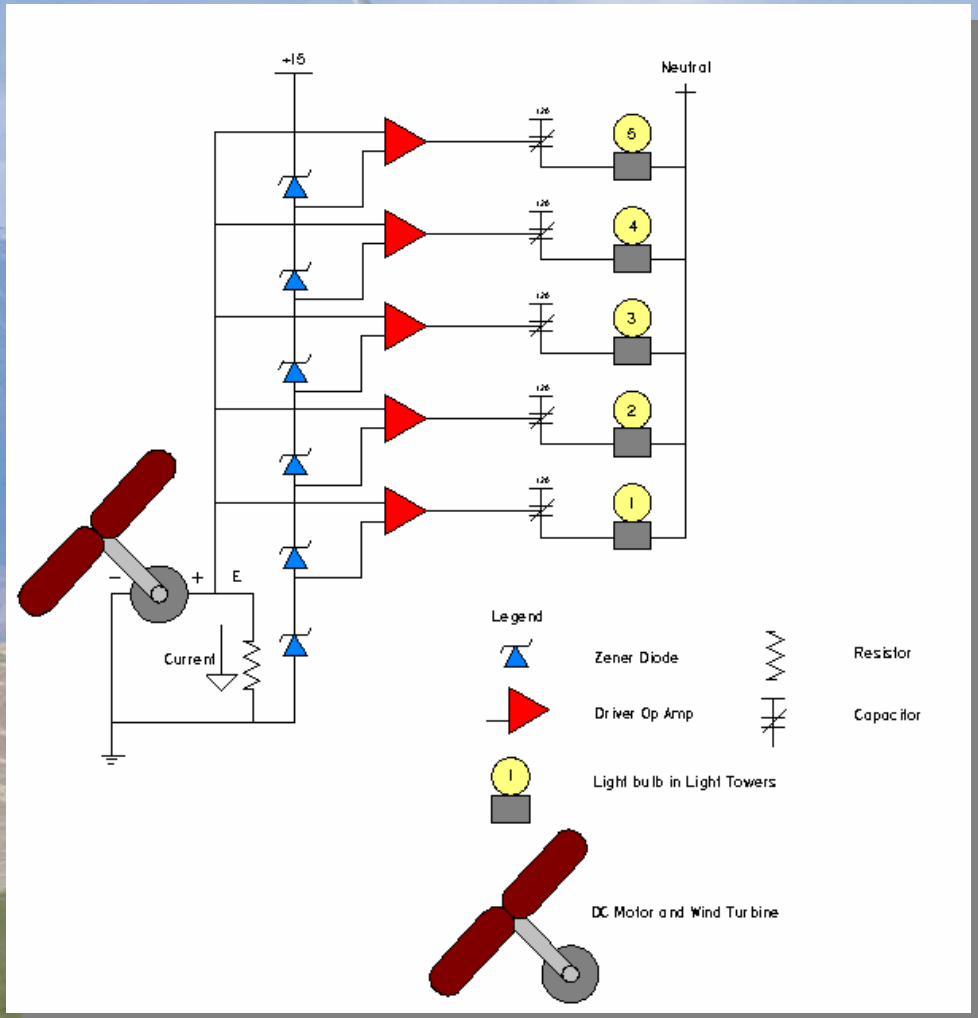
Kill Switch



Light Towers

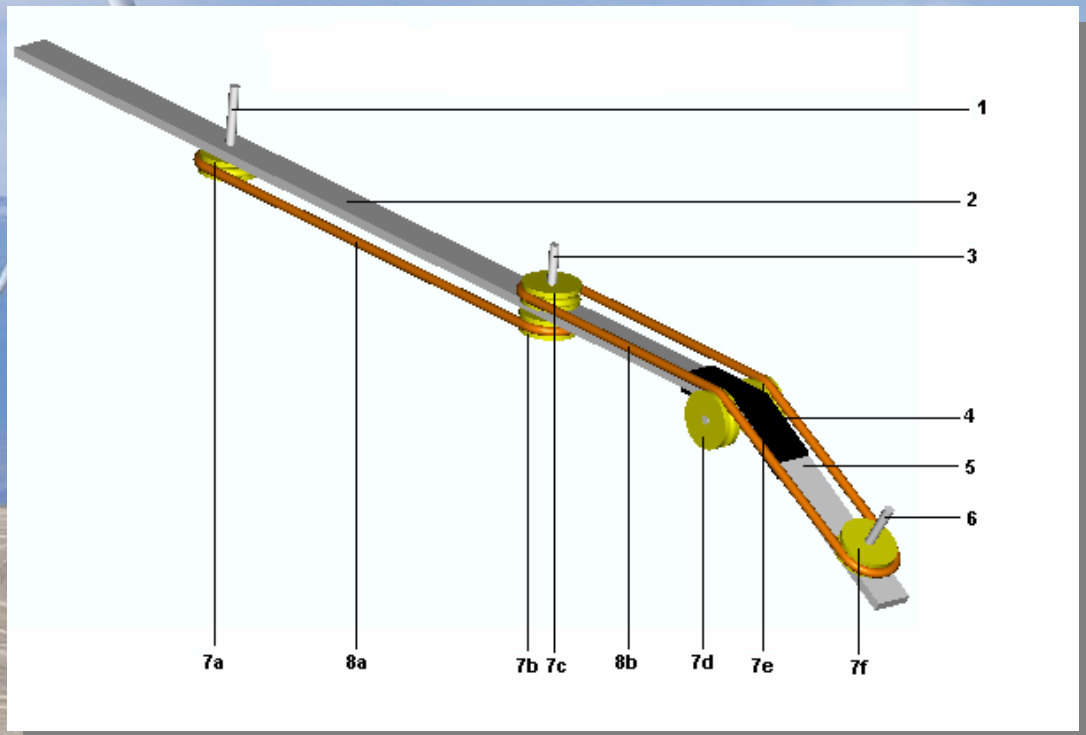
Anemometer

Electrical Circuit Diagram



Pulley Selection

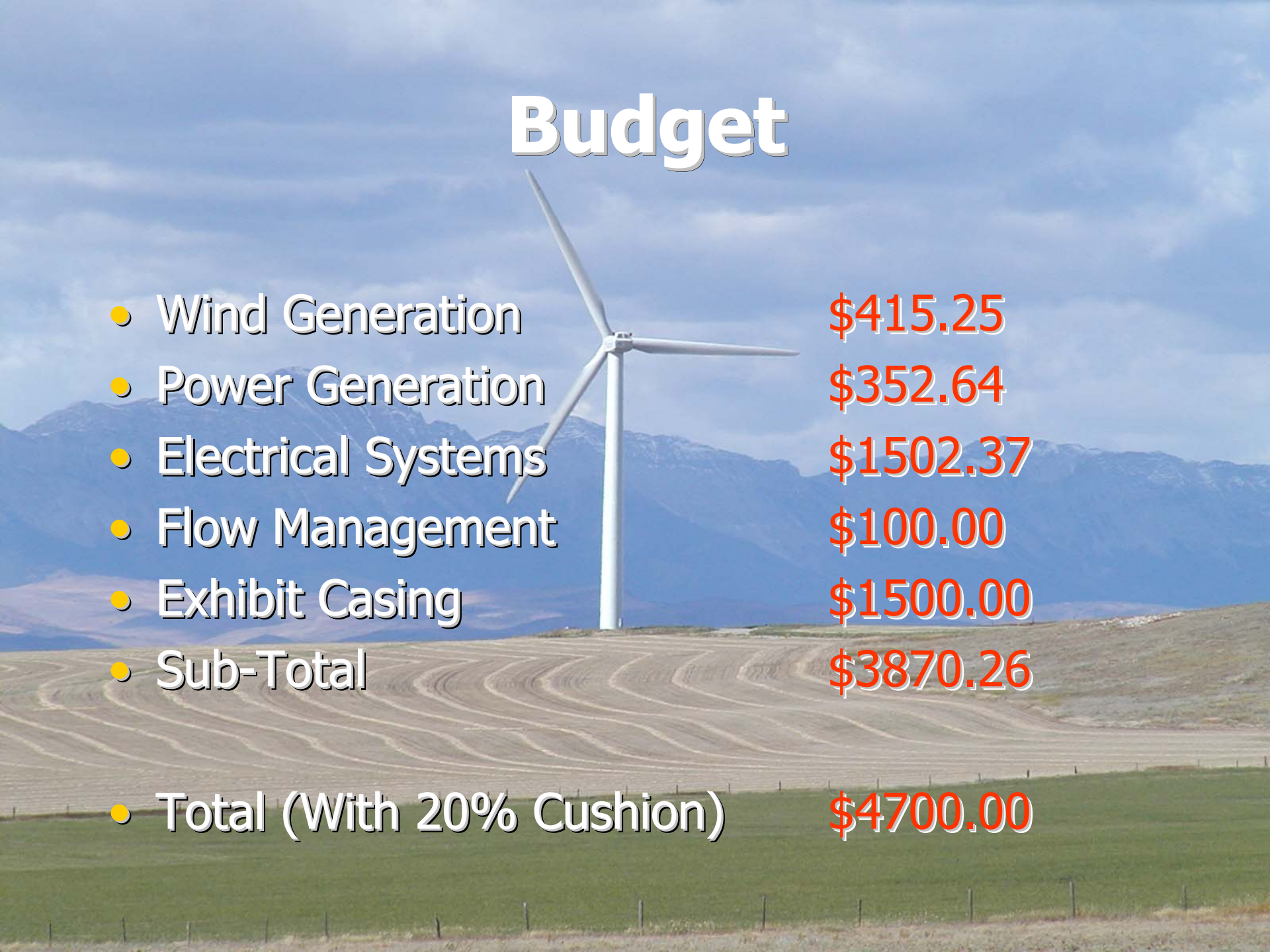
- On the control panel there will be a knob that will allow a guest to rotate the turbines within the exhibit
- The rotation is made possible through the use of pulleys purchased from McMaster



Final Design Specifications

- Project Analysis
  - Exhibit Dimensions and Frame Design
  - Frame Material and Building Options
  - Cabinet Maker
  - Wind Generation & Velocity Measurement
  - Electrician
  - Budget Analysis
- Components
  - Wind Turbines
  - Power Meters
  - Start Buttons
  - Kill Switch
  - Honeycomb
  - Fan

Budget



• Wind Generation	$415.25
• Power Generation	$352.64
• Electrical Systems	$1502.37
• Flow Management	$100.00
• Exhibit Casing	$1500.00
• Sub-Total	$3870.26
• Total (With 20% Cushion)	$4700.00

Future Work

- Make Formal Presentation to the Museum
- Begin Ordering Parts
- Start the Assembly of the Exhibit
- Testing of components

Acknowledgments

- Ms. Heather Whitaker – Director of MAOS
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- Dr. Cartes – ME Department
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- www.Inspeed.com - Free Vertical Axis Rotor