PROJECT TWO: MILESTONE 2 – COVER PAGE

Team Number: Tues-36

Please list full names and MacID's of all *present* Team Members

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MILESTONE 2 (STAGE 1) – REFINED PROBLEM STATEMENT FOR A WIND TURBINE

Team Number: Tues-36

The Title of The Assigned Engineering Scenario

A Pioneer in Clean Energy

Write the Initial Problem Statement Below

→ This is a *copy-and-paste* submission of what you submitted for Milestone 1

A device to capture the kinetic energy of wind and transform it into electrical power.

Finalized Objective Tree of Wind Turbine for Your Assigned Engineering Scenario

→ Please have a copy of your finalized team objective tree of wind turbine for your assigned engineering scenario.
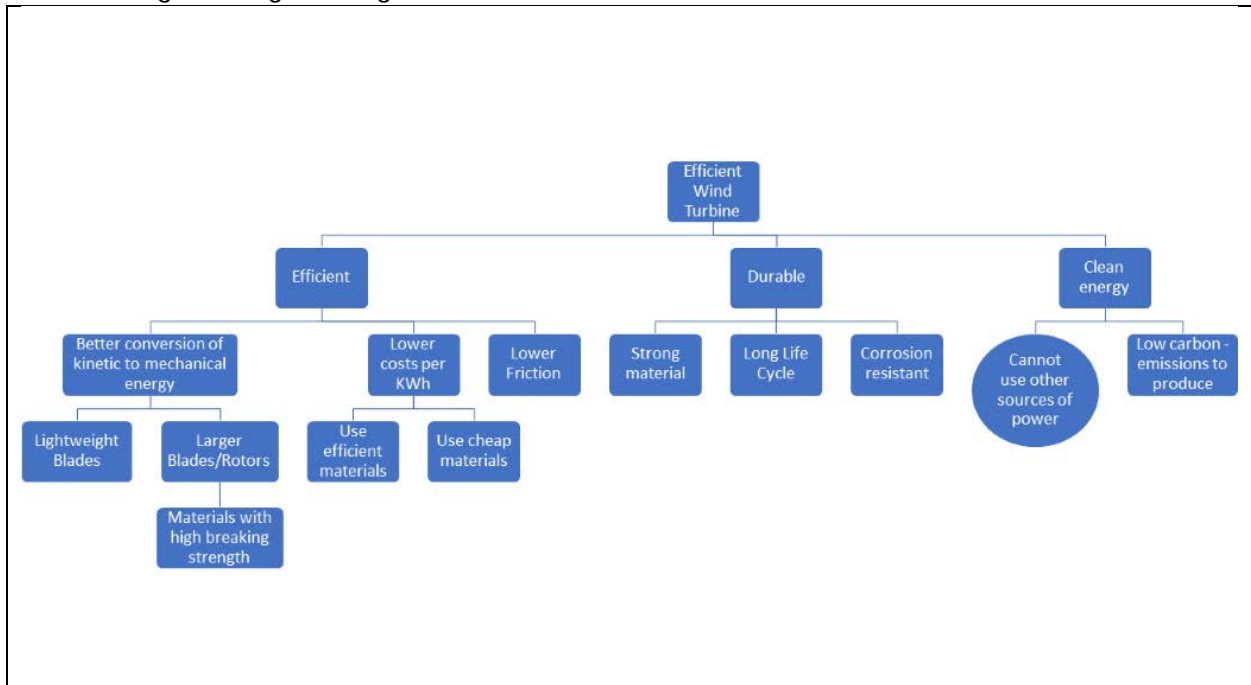
Refined Problem Statement:

→ Write the refined problem statement for the design of wind turbine based on your assigned scenario.

An eco-friendly device designed for the Swedish Wind Energy Association, to act as an alternative source of power to fossil fuels, so that Sweden can reduce their greenhouse gas emissions to zero by 2045. The device should be an efficient and sustainable mechanism to convert the kinetic energy of the wind into electrical power.

MILESTONE 2 (STAGE 2) – DESIGN REQUIREMENTS FOR A TURBINE *BLADE*
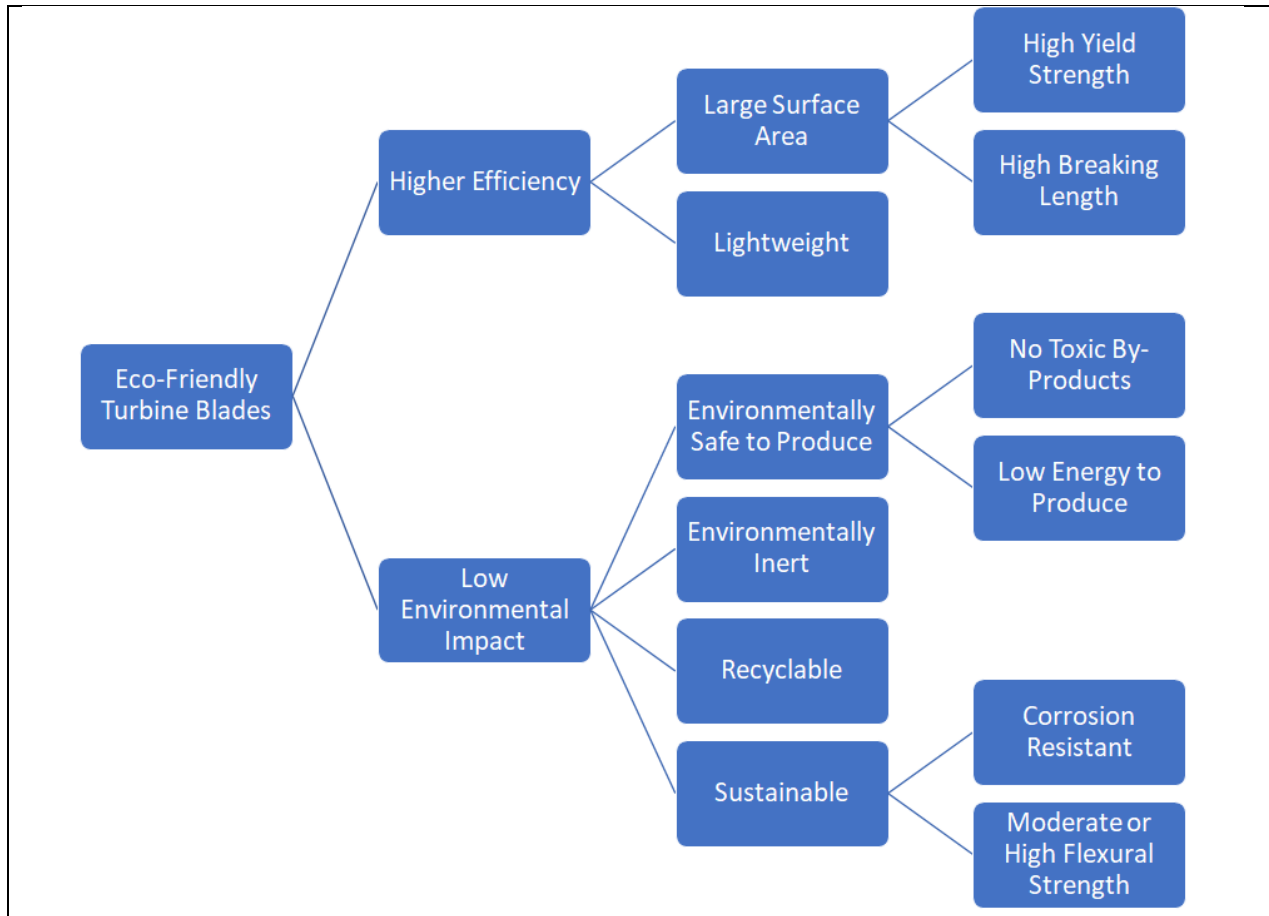
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Turbine Blade Problem Statement:
→ Write a complete problem statement for the design of turbine *blade* based on your assigned engineering scenario.

A wind turbine blade for the Swedish Wind Energy Association in Sweden that provides power to cities and reduces their carbon emissions. It should have a low environmental impact to produce, efficient, and high yield strength to better harness the energy of the wind.

Objective Tree of turbine blade for assigned engineering Scenario
→ Please have a copy of your team objective tree for the design of turbine blade of your assigned engineering scenario.

MILESTONE 2 (STAGE 3) – SELECTION OF TOP OBJECTIVES FOR A TURBINE BLADE

Team Number: Tues-36

List the top three objectives of a turbine blade for your assigned engineering scenario

1: Low carbon footprint to produce
2: Efficient enough to power cities
3: Strong enough to not yield to wind

Include a rationale for selecting each of these objectives
→ Write *maximum* 100 words for each objective

Objective 1: Low carbon footprint to produce

Rationale: The turbines need a low carbon footprint to produce as the primary goal of this imitative is to reduce carbon emissions to zero by the year 2045. Therefore, the materials used to produce the turbines cannot themselves create carbon emissions to create. Additionally, it would be preferrable

to have a lower energy of production to create the materials and the turbine itself, however it is not a requirement as eventually all energy will be carbon free. Finally, certain methods of production or assembly, such as welding, should be avoided as they require the combustion of greenhouse gasses.

Objective 2: Efficient enough to power cities

Rationale: It should be able to catch enough wind to produce enough energy to power cities and to not have too much drag so it can last long enough to not be replaced regularly otherwise we would be creating an eco-friendly wind turbine that produces below average energy which would in turn require more units or a blade that must be replaced often which also requires more units.

Objective 3: Strong enough to withstand the force of wind

Rationale: It needs to have a deflection value less than 10mm and be able to withstand the pressure load without yielding when experiencing high pressure. Therefore, the chosen material should be sturdy enough to withstand pressure load and light enough to maintain stability.

MILESTONE 2 (STAGE 4) – METRICS

Team Number: | Tues-36 |

For your selected top three objectives fill out the table below with associated metrics (including units) for each objective.

Objective 1:	Low carbon footprint to produce
Unit/Metric:	Point rating system (metric tonne / capita / blade) • Low result: 0 points • High result: 10 points https://www.researchgate.net/publication/307614361_The_environmental_impact_of_wind_turbine_blades/link/57e28d1c08ae1f0b4d95e765/download

Objective 2:	Efficient enough to power cities
Unit/Metric:	Power produced per 3 blades (kW/h)/year/3 blades • 7 million (kW/h)/year • 6 million (kW/h)/year • 5 million (kW/h)/year • 4 million (kW/h)/year • 3 million (kW/h)/year • 2 million (kW/h)/year • 1 million (kW/h)/year • 0 (kW/h)/year https://www.ewea.org/wind-energy-basics/faq/#:~:text=The%20output%20of%20a%20wind,average%20EU%20households%20with%20electricity.

Objective 3:	Strong enough to not yield to wind - point system: 0(worst) to 10 (best)
Unit/Metric:	wind speed in x km/h that wind blades can resist - 10: 90+ km/h - 9: 83 km/h - 8: 75 km/h - 7: 68 km/h - 6: 60 km/h - 5: 53 km/h - 4: 45 km/h - 3: 38 km/h - 2: 30 km/h - 1: 23 km/h - 0: 15- km/h