CSR Proposal of Social Relevance

1. Title of Project: Recycling Fiber Reinforced Polymer (FRP) Waste for Infrastructure Use

2. Background/Motivation: Fiber reinforced polymers have become an integral part of our daily lives. FRP is being used extensively in automobiles, airplanes, wind turbines, and to a lesser extent, in infrastructure applications. A large number of wind turbines are being decommissioned in the recent days as they have started reaching the end of their service lives. More are likely to reach the end of their service lives as there is a constant push to install larger wind farms with bigger wind turbines. Similarly, modern cars and airplanes use a large amount of FRPs. After the completion of the service life, disposing the GFRP (glass fiber reinforced polymer) blades of these wind turbines in an environmentally responsible way is a major challenge. The use of plastics in these composites makes them unsuitable for landfill. It is proposed to study the possibility of recycling used FRP components in infrastructure applications such as reinforcement in concrete structures.

3. Objectives of the project: The proposed project aims to study the feasibility of recycling GFRP composites in infrastructure applications. The proposed research will involve:

- Developing a method to characterize the residual strength and service life of the salvaged FRP material.
- Developing the technique to allow the recycled material to act as reinforcement in concrete structures.
- Developing guidelines for using the recycled material as internal reinforcement in RC members.

4. Brief Methodology: The following methodology will be employed to reach the above objectives:

- In collaboration with one of the industries mentioned above, used FRP components will be salvaged.
- The salvaged components will be cut in shapes and sizes that makes them suitable for use as a reinforcement material in concrete structures.
- These parts will be characterized for mechanical properties such as strength and stiffness, and remaining service life characteristics through fatigue tests to assess their suitability in infrastructure applications.
- These components will then be embedded into concrete components as a reinforcement material and the strength of these reinforced concrete members will be tested in compression and bending.

5. Target population/Beneficiaries:

- The outcome of the research will help keep the polluting plastics away from landfills.
- The users of the FRP components such as wind farm owners, automobile industry, etc. will be the direct beneficiaries of this research.

6. Expected Outcome/Deliverables:

- Establishing a proof of concept
- Developing guidelines based on the suitability of a component for recycling
- Developing guidelines for the use of recycled FRP components as reinforcement in concrete structures
    - Address the issue to bond development between concrete and the recycled components
    - Strength requirement
    - Stiffness requirement
    - Service life requirement

7. Timeline and Budget:

	Year 1	Year 2	Year3
Budget (in Rs lakhs)	7,00,000	7,00,000	7,00,000
Milestones	1. Identifying the FRP component to be salvaged in collaboration with the partnering industry. 2. Studying the material characteristics and remaining service life of the salvaged material. 3. Shaping the component in a suitable way to be used as internal reinforcement.	1. Testing the recycled material for available strength, stiffness, bond strength, and fatigue life. 2. Preparing the concrete specimens and studying the behavior of the reinforced concrete system in compression and flexure.	1. Testing the recycled FRP bars for bond with concrete. 2. Testing the RC members in compression, bending, and fatigue life. 3. Development of the guidelines for use of recycled FRP as rebars in concrete.

8. Proposer Name & Designation:

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