**MARMARA UNIVERSITY**

**FACULTY OF ENGINEERING**

**ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT**

**PROPOSAL FORM**

**FALL 2024-2025**

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| **Instructor : A. Evren Tugtas**  **Project Title :** Estimating the Carbon Footprint of Kitchen-type Food Waste Dryers  **Proposal No. :** Evren Tugtas*-*1  **Number of Students :** Maximum of 3 students  **Requirements (from students):** Students should have basic computer application skills and a basic understanding of carbon footprint calculations and waste management practices. |
| **Scope of the Project :**  The proposed project aims to estimate the carbon footprint associated with kitchen-type food waste dryers. These devices are increasingly used in households and commercial kitchens to reduce the volume of food waste and facilitate its disposal or reuse (e.g., as compost or animal feed). The study will evaluate greenhouse gas (GHG) emissions throughout the lifecycle of these dryers, including electricity consumption during operation, the environmental impact of production, and the potential GHG reductions from avoiding landfill disposal. The goal is to evaluate the potential benefits of food waste dryers as a sustainable waste management solution compared to traditional methods like landfilling. By the end of the project, students will provide a comparative analysis of the environmental impact of food waste dryers and highlight opportunities for reducing their carbon footprint. |
| **Hardware/Software/Lab/Equipment Requirements :**  Open/Free or student version of   * **Carbon Accounting Software**: For carbon footprint calculations (OpenLCA, CCaLC: Carbon Calculations over the Life Cycle, GaBi Education). * **Energy Consumption Tools**: For estimating electricity use and emissions (EPA’s Energy Star, RETScreen). * **Emission Calculation Tools**: For quantifying GHG emissions (EPA’s WARM Model, GHG Equivalency Calculator). * **Standards**: ISO 14067:2018 Greenhouse gases - Carbon footprint of products. |
| **Development Plan :**   * Identify necessary data for each scenario, such as electricity consumption, dryer capacity, waste volume reduction, and emissions data. * Gather data from manufacturers, literature, and user manuals to assess energy consumption and environmental impact. * Quantify the carbon footprint (CO₂-eq emissions) by considering:   + **Direct emissions**: From energy consumption during operation.   + **Indirect emissions**: From the production of dryers, transportation, and waste disposal. * Assess the avoided emissions from diverting food waste from landfills using food waste dryers. * Analyze emissions reduction potential through electricity-saving practices (e.g., energy-efficient dryer models). * Compare the carbon footprint between food waste dryers and landfilling * Compile the results into a detailed report, including carbon footprint calculations * Incorporate visual aids like carbon footprint graphs and flowcharts * Provide actionable recommendations for consumers or manufacturers on improving the sustainability of kitchen-type food waste dryers. |