DSS5202 Sustainable Systems Analysis
Assignment #1
Due: 2 September 2024

Instructions

You may use computing tools or software to compute your final answers but you must explain your workings by breaking down the steps in your computations.

Submit your answers to this assignment as **one PDF file** via Canvas.

Problem Description

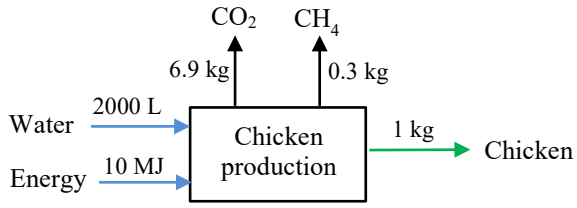
In this assignment, you will conduct a simplified LCA on Creamy Chicken Spaghetti (DSS edition). To produce one serving of the dish, the following ingredients are required:

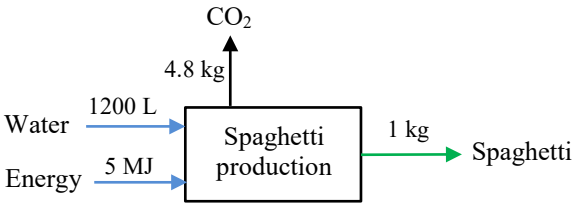
1. 200 grams of chicken
2. 100 grams of spaghetti
3. 50 grams of cream

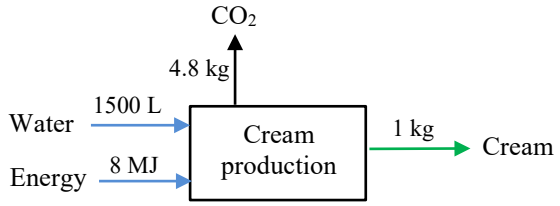
The ingredients are produced at separate locations and transported to the restaurant where they are cooked on a gas stove. The cooked food is then consumed by customers producing wastes which must be treated and disposed of. We will label these 5 phases of the life cycle as follows:

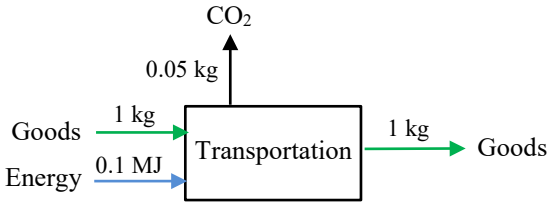
1. Production of ingredients
2. Transportation
3. Cooking
4. Consumption
5. Waste food treatment

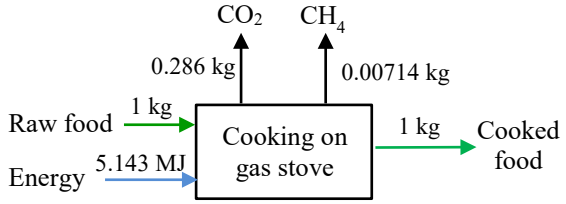
The **Unit Processes** for this simplified product system are given below:

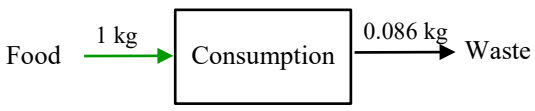


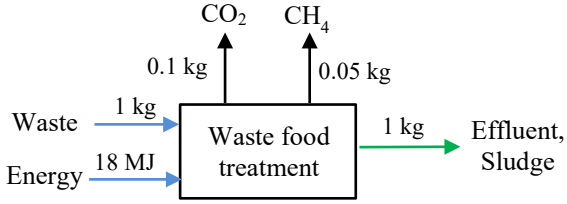












Answer the following questions:

1. Define the **Functional Unit** for this LCA. (5 marks)

2. Draw a **Production System Diagram** for this product and indicate the system boundary. (10 marks)

3. Conduct an **Inventory Analysis** for each stage of the product life cycle. (20 marks)

4. Conduct a **Life Cycle Impact Analysis** of the product based on the following impact categories and characterizations:

1	Global warming potentials (GWP)	kg CO_2 eq
2	Water consumption	Liters of water consumed
3	Energy consumption	MJ of energy used

   Assume that the characterization factor for 1 kg of CH_4 (Methane) towards GWP is 28 kg CO2 eq. (10 marks)

5. Compare and comment on the environmental impacts of this product over its life cycle. State the major limitations of this study and suggest possible improvements to this analysis. (5 marks)