Limits to Growth WS24/25

Exercise – 5

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Deadline: 11.12.2024 – 1:00 pm

Do you have any questions? Contact us via email etce-ltg@tu-clausthal.de or write a message in the Matrix channel!

Task(s):

Task 1: The goal of this LCA exercise is to compare the water consumption of washing dishes: manually using a sink vs a dishwasher, to determine which consumes less.

- We (simplisticly) assume that a dishwasher at full load requires ~11 litres of water to perfectly clean 20 dishes, 20 glasses and 20 pieces of cutlery. We do this to obtain comparative results. We have further standardized the scope of this (unscientific) LCA:
  - Functional Unit: 20 dishes, 20 glasses and 20 pieces of cutlery cleaned.
  - Reference Flow: Amount of water consumed (in Liters)
- Your main task is to collect LCI data, and determine "How much water do ***you*** consume to perfectly clean 20 dishes, 20 glasses and 20 pieces of cutlery?" We denote this target value by ***X***.

Steps:

1. Compute the *Flow Rate (**f**)* of your tap using a timer:
   1. Grab an empty cup which has a known maximum capacity (or a graduated measuring cup). We assume this maximum capacity is ***c*** *liters.* Remember to compute this in liters and not milliliters.
   2. Turn on your kitchen tap until the flow of water is indicative of what you use to clean dishes. Be sure to take note of the exact position of the tap, perhaps by using a marker on your tap.
   3. With the tap open in this position, use a timer to determine the number of seconds (***t***) required for the cup to fill to it's maximum capacity.
   4. Compute the Flow Rate (***f***) = ***c / t*** Liters per second.

2. Lifecycle Inventory Analysis
    - For this exercise you will only wash dishes under running tap water, and we divide this system into individual unit processes; one each for washing a dish, a glass and an item of cutlery, For each of these unit processes, we collect data.
        1. Wash 1 dish, while using a timer to count how much time the water is flowing. Ensure that you use the same tap position as used when computing the flow rate, and that you measure the time in seconds.
        2. Repeat this process for at 2-3 dishes (possibly of different sizes and levels of dirtyness) and compute the average time required. We denote this average time by T_d.
        3. Repeat steps 1 and 2 for glasses and cutlery, computing T_g and T_c respectively.
        4. To relate the data collected to the functional unit of "20 dishes, 20 glasses and 20 pieces of cutlery cleaned", compute $X = (T_d + T_g + T_c) * 20 * f$ Liters

Submission instructions

- Submit the result (**X**) via the poll – Link
- **BONUS:** If you have a dishwasher, try to determine how much water it consumes for a full load.