UNIVERSITÉ DU LUXEMBOURG

JUMP
PROOF OF CONCEPT STUDIES

Exercise task regarding potential internship

Suppose a customer who wants to sell water can choose between two different packages. Either a PET water bottle or a glass water bottle.

Depending on which packaging the customer chooses, this has a different impact on sustainability (e.g., a different carbon footprint) because the respective processes behind it are different. Glass bottles can be used multiple times as they are washed and then refilled, while PET bottles can be recycled into a new bottle.

The various processes are explained in simplified form below:

A. PET water bottle:
   a. Bottle weight for 0,5l = 25g
   b. Transportation can be neglected
   c. Number of cycles: 1

PET	Production			Filling			Packaging			Sorting			Recycling		
	WC	2.500	l/ t	WC	1.000	l/ t	WC	0	l/ t	WC	0	l/ t	WC	10.000	l/ t
	NRG	20	kWh/t	NRG	1	kWh/t	NRG	2	kWh/t	NRG	2	kWh/t	NRG	5	kWh/t

B. Glass water bottle:
   a. Bottle weight for 0,5l = 400g
   b. Transportation distance = 100km
   c. Number of cycles: 10

Glass	Washing			Filling			Packaging			Transport		
	WC	2.500	l/ t	WC	100	l/ t	WC	0	l/ t	WC	0	l/ t
	NRG	1	kWh/t	NRG	0,1	kWh/t	NRG	0,1	kWh/t	NRG	0	kWh/t
										CO_2-eq	100	gCO2/ tkm

General information:

- WC = Water-consumption (in liter per ton of used material)
- NRG = Energy-consumption (in kWh per ton of used material)
- CO2-eq = CO_2-equivalent (in gCO2-eq per km of transported ton)

Your task is now the following:

1. Set-up a database with the given information or use your own data from online databases (e.g., LCA-databases)
2. Calculate the CO_2-equivalent for the energy-consumption (link for CO_2-equivalent (g par kWh) in Luxembourg, 2018)
3. Set-up a simple graphical user interface (GUI) where the customer can select the different packaging and get as output the water and energy consumption as well as the CO2 equivalent and the number of cycles a product can be used.
   Make sure that the values displayed for the two types of packaging are comparable.
4. Addition (have a least an idea/ proposition on how to solve this): Set up a way to visualize the different processes and highlight the chosen path (PET or glass) in the form of a diagram.

We currently use a mix of Python (back-end), PostgreSQL, HTML, Docker, Flask and React Flow. However, you can choose which framework you prefer.

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