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Interuniversity Research Centre for the
Life Cycle of Products, Processes and Services

Lab 5 – Sensitivity analysis
Carbon footprint of a carbonated water can

POLYTECHNIQUE MONTRÉAL

WORLD-CLASS ENGINEERING

Context

The interpretation of the carbonated water can system has started during lab 4 after the impact assessment.

During this lab we will deepen the interpretion with sensitivity analysis.

Question 1

Sensitivity analysis (scenario) – Show with a graph how the result would change according those changes in the system:

a) Use different impact method (IMPACTWorld+(Default_Recommended_Midpoint 1.29) / *ReCiPe Midpoint (E) V1.13 no LT)*

Step 1) Recalculate the endpoint results with IW+ for the two system from lab 2
Step 2) Copy results in Excel
Step 3) Recalculate the endpoint results with ReCiPe for the two system from lab 2
Step 4) Copy results in Excel
Step 5) Plot a comparative graph between the two methods

Question 1

Sensitivity analysis (scenario) – Show with a graph how the result would change according those changes in the system:

b) Add a parameter and compare the evolution of this parameter according this scenario : Some can factory are more efficient then other. We assumed 13 g of aluminium to produce a can and no waste in the transformation process. Do the calculation again with a waste rate of 2% and 4% in the can factory. (use lab 1 system)

Step 0) Calculate the baseline scenario the IW+ midpoint and copy it to Excel
Step 1) Create a parameter waste rate (2%)
Step 2) Change the input and output of the can production process (form lab1 folder)
Step 3) Create a new product system
Step 4) Calculate results with IW+ midpoint method and copy impacts to Excel
Step 5) Go back into the system process and change the value of the parameter to 4% in the parameter tab
Step 6) Calculate the results with this new parameter value and copy the results in Excel
Step 7) Plot a comparion graph between the basleine and the 2% and 4% results

Question 2 - Sensitivity analysis (tornado graph)

Order in an ascending way the sensitivity of those different parameters according the climate change midpoint indicator from IW+ (Climate change, non-renewable energy, particle matters, water consumption) (use lab 1 system) :

- **Aluminium mass of the can**
- **End of life transport distance**
- **Amount of electricity for the can production**
- **Amount of natural gas in can production**

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Question 2 - Sensitivity analysis (tornado graph)

Order in an ascending way the sensitivity of those different parameters according the climate change midpoint indicator from IW+ (Climate change, non-renewable energy, particle matters, water consumption) (use lab 1 system) :

Step 1) Create parameters (distance_eol, elec_consumption, gn_consumption, gn_d_emission, mass_alu) and change input values to newly created parameters
Step 2) Create the product system
Step 3) Go to parameters tab and add parameters
Step 4) Change the value of 1 parameter
Step 5) Calculate result with IW+ midpoint and copy impact results to excel
Step 6) Redo Step 4 and 5 for all parameters
Step 6) Calculate baseline scenario
Step 7) on Excel, plot the tornado graph with copied results

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Why, where and which?

LAB 5 – SENSITIVITY ANALYSIS

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