

Short Term Scientific Mission (STSM) 2014

Sensitivity and uncertainty analysis applied in Life Cycle Inventories

June 11th, 2014 | September 10th, 2014

Objectives

The objectives of my stay in KompetenzZentrum Wasser Berlin (KWB) were to learn how to incorporate sensitivity and uncertainty analysis in my LCA PhD work. Specifically, during my stay, the sensitivity analysis was applied into a semi-automatic tool to perform LCA inventories for sewer systems, which I have developed during my PhD.

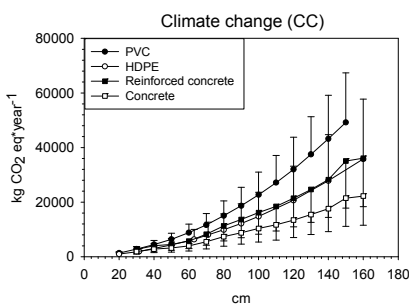
Methodology

Sensitivity analysis is a technique used to determine how different values of an independent variable will impact a particular dependent variable under a given set of assumptions. Sensitivity analysis is a way to predict the outcome of a decision if a situation turns out to be different compared to the key predictions. (Definition from www.investopedia.com).

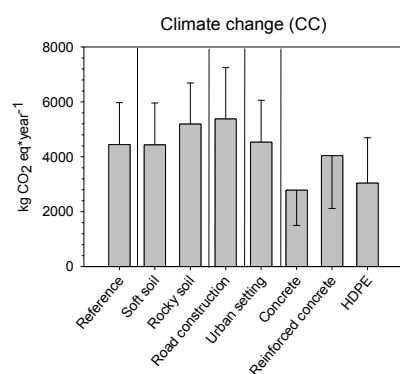
To perform the analysis the tool for LCA of trenches was improved and then the tool was used different times changing different parameters, after the results were plotted in order to detect which are the most important factors affecting the trenches construction.

Results

In the results section only the results for the Climate change are showed although more impact categories were analyzed.



Different tube materials were evaluated (PVC, HDPE, concrete and reinforced concrete). The lifespan was included in the evaluation. PVC pipelines have always larger impact than the other pipelines. The differences between PVC and HDPE are explained by the different life spans (25 against 40 years). Compared to reinforced concrete/concrete, PVC has an impact between 5% to 49% larger in small diameters and between 53% to 145% larger for bigger diameters.



The effect of site-specific characteristics was evaluated together with different tube materials. Error bars correspond to the life span of the tubes. Road construction has the highest impact. Analyzing the excavation, rocky soil has the largest impact, due to the increase of diesel consumption. Location of the trench is not important because the difference between the reference and the location in an urban area is very small. Finally, analyzing the different materials, reinforced concrete is the material with the highest impact and concrete is the material with the lowest impact.

Highlights

- Tool development for LCA of trenches construction.
- Sensitivity analysis applied in LCA studies.
- LCA of water infrastructures construction.

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