Master’s Thesis

## Moving toward sustainable urban farming by developing circular economy models

## Background

## The increasing and never-ending challenge of supplying food demand has aroused great interest among the scientific community to find possible breakthroughs for the production of higher amounts of food. To tackle this problem, agricultural sectors have undergone dramatic changes and thereby significant improvements have been made for increasing the yield of products. One of the most recent strategies for increasing the production of agricultural products is implementing the third dimension of farming areas where plants will be stacked on top of each other until a tower arises as a ‘Vertical Farm’. Thus, the production rate could be multiplied compared to open farming and conventional farming in the same area. Apart from the production of higher amounts of food, vertical farming could considerably decrease the transportation distance to deliver the products to consumers. In addition, cultivating agricultural products in a controlled and preserved environment could reduce the amount of fertilizer consumption and diminish the usage of pesticides. Nevertheless, the large-scale implementation of vertical farms has not been feasible yet because of the high energy demand and its associated environmental burdens and costs. Accordingly, it is important to develop sustainable urban farming models to decrease the hazardous environmental impacts of future vertical farms.

## Goals

In this master thesis, the environmental impact of a virtual vertical farm is analyzed in Germany by implementing life cycle assessment techniques. Then, circular economy models for urban framing (i.e., focusing on nutrient supply and energy supply) are developed to find out the possible opportunities for reducing the environmental impacts of urban farming. Afterward, circular economy models are compared to the baseline scenario from the environmental point of view.

## Contact

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