Clean water from atmospheric air

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INTRODUCTION

The increasing population in the world challenges our water resources. The UN predicts that the population will increase from todays 6.6 billion to 9 billion by 2030. About 40 % of the world's population live with water scarcity today. By 2030 this will increase to about two thirds. In addition to water scarcity it can be problematic to get clean water in some communities. Dirty water is followed by diseases such as cholera and typhus, which if not treated properly is deadly. This project focuses on extracting water from air and hereby be able to provide clean drinking water to people without sufficient water supply. This has successfully been achieved in for example Lima, where a huge billboard provides clean drinking water to the area. The wish is to create a similar product but on a smaller scale so that the product can be used in a normal household, which needs approximately 25 liters of clean water per day for drinking and cooking.

THEORY

The air contains a lot of water. On cold mornings this is evident by the dew forming on grass and windows. The project will take advantage of this unexploited water resource. By using a dehumidifier the atmospheric air can be condensed into water and later on this can be filtered into clean and safe drinking water. The idea is to analyze and optimize a dehumidifier so that it will extract as much water as possible for the smallest amount of energy, but not necessarily dehumidify the air efficiently.

METHODS

On a normal dehumidifier it will be tested how much water can be extracted from the air and how much energy this will cost. During these tests various parameters, such as humidity, temperature, pressure and energy consumption, will be measured. An optimization of the dehumidifier will then be investigated. Will it be possible to extract even more water by changing various parameters? Such as temperature of the refrigerant or the speed of the fan. These different scenarios will be simulated in EES by using methods known from thermodynamics, fluid mechanics and heat transfer. This will help identify the optimum of how to achieve as much water as possible for the minimum amount of energy.

CONCLUSION

The project is still ongoing and will end shortly before GREEN CHALLENGE. By the time of the conference results from the project will be presented.