

Project No.	Project Title	
2021-01-189	Ben Gurion University Roadmap for Zero Carbon Emission	
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Abstract

Since the Industrial Revolution, there is an upward trend in carbon and waste emissions. This trend increases the "greenhouse effect", a phenomenon that takes place in the Earth's atmosphere. As a result, we are violating the balance that has existed here for the last ten thousand years, and the temperature on Earth is rising gradually. According to estimates, if this trend continues in the coming years, we will reach a point of no return, our world will change in a way that cannot be restored.

To stop this trend, there are many possible solutions that can reduce and possibly eliminate carbon emissions and waste. However, to determine which solutions to implement, an assessment of their potential benefit and the resources required to implement them is required. Therefore, we have built a model that will assess the effect of the solutions. The model can take into account the following domains and the interaction between them: electricity, agriculture, industry, transportation, construction, and other energies. The model is a generic model that can interface with a variety of different institutions: countries, cities, schools, etc. In the first stage, the model receives as input the consumption data of the institution. In the second stage, it calculates the equations and the relationships according to the data it received in the previous stage and presents a picture of the carbon emissions in the "Current State". In the third stage, it calculates the reduction for each of the possible steps in the institution, and finally, in the fourth stage, we will develop an optimization with constraints tailored to the institution.

After completing the first three-stage of the model development, we began to make the relevant adjustments for the "Ben Gurion University". As a first step the focus on the area of energy the is considered to be the leading cause for CO2 emissions. using the database of BGU energy consumption, the buildings were divided into four main categories: "Classes & Offices" "Labs", "Administration" and "The Energy Center". From the analysis, it can be seen that the main energy consumers are the "Labs", which use large computing power, and "The Energy Center" which provides the cooling water for the air conditioning services to all the buildings. The short-term goal is to gain a better understanding of the users in BGU. There is a need to develop a method that will be able to calculate the energetics requirements of each building based on their cooling water consumption. In addition, there is a need for a forecasting model that can predict the future consumption of the buildings on the North Campus, using features such as size, type, power computing it contains, number of people, etc.

In the long-term, the research aims to provide possible solutions to be taken to reach a state whereby 2030 the university's carbon emissions will be zero.

Keywords: CO2 reduction, Optimization model, Sustainability, University.