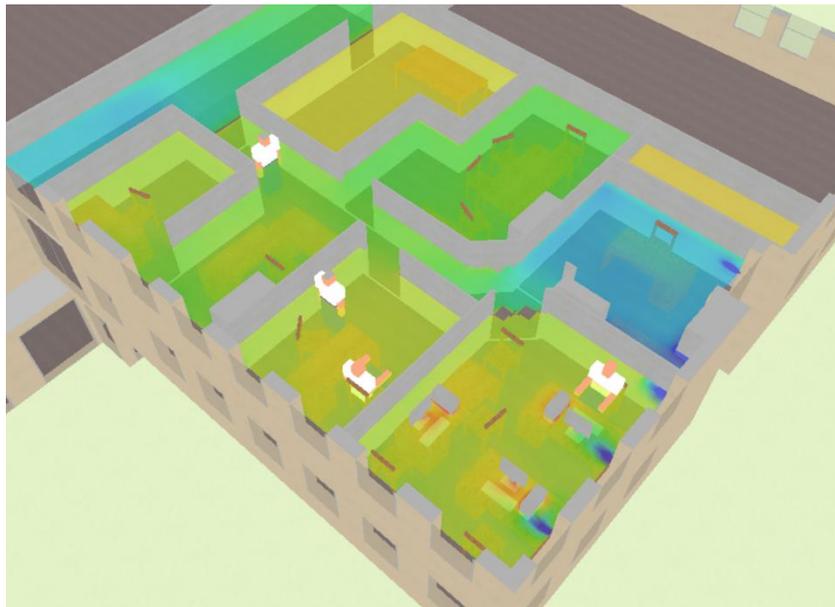


## Planning for Productivity

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If you could increase your staff productivity by making a simple improvement to the building they work in, would you? One factor that can lead to better productivity is indoor temperature and thermal comfort. Greenplan recently undertook an analysis of an office in Somerset West that has air-conditioning but the staff prefer not to use it. One of the purposes of the study was to determine the effect of thermal insulation above the ceiling on temperature and staff productivity. Currently the ceiling is uninsulated.

A 3D model of the office and surrounding building was created in DesignBuilder, and simulations were undertaken with hourly weather data. No artificial heating or air-conditioning was simulated. A sample temperature colour plot on a hot January day is shown below for the case without ceiling insulation.



**Figure 1: Air temperature colour plot (dark blue: 36 °C; dark red: 43 °C)**

The loss of productivity related to temperature and thermal discomfort can be predicted from a number of mathematical correlations. Bearing in mind that such correlations are based on averages and are dependent on some subjective factors, the addition of thermal insulation on the ceiling in this case was predicted to increase the annual productivity of staff by 3-4 % **due to improved conditions in hot weather**. For this office, the insulation material cost would be 10-30 % of the increase in productivity in one year. A favourable return on investment could be obtained with a payback period of less than a year – it would only take a few months to profit from the benefit of the insulation!

## DesignBuilder Case Study

With the building in its current state without insulation, if air-conditioning were used to control the temperature between 19-25°C, 90 % more electrical energy would be consumed than if ceiling insulation were installed.

Temperature and thermal comfort are one of several factors that can affect employee productivity. There are others such as daylight and outdoor air supply. Don't underestimate the possible impact of these on your employees.



**Greenplan Consultants** offer services for sustainable energy solutions, solar loads, thermal comfort and general advice on passive building design concepts. We have extensive experience in all Green Star SA Credits that require building performance modelling.