34. Commercial buildings: Air-conditioning

This lever allows the user to investigate the impact of air conditioning of non-domestic buildings: office space, hospitals, restaurants ect. Good passive design can substantially lower the number of hours cooling needed a year, while poor facade design can actually increase it.

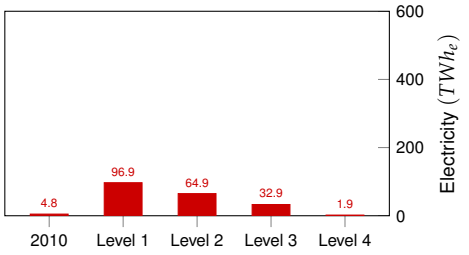

Figure 34.1: 2050 Air conditioning demand

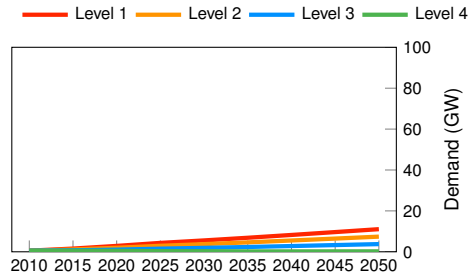

Figure 34.2: Demand for Air Conditioning Scenarios

The last decade

The percentage of the population employed in the service sector has remained constant for the last decade. The nature of the work is changing, with more people working for large companies in retail, restaurants or offices and other desk jobs.

Assumptions of model

With limited data, the model uses assumptions based on the number of people working in the commercial sector to estimate the amount of floorspace that is required to be cooled. The number of school-going children in the population is used to estimate school sizes, and similarly the number of medical doctors to estimate hospital sizes.

Levels

Level 1

Energy demand for cooling increases from 4.8TWh to 96.9 TWh (for a level 3 population setting)

Level 2

Energy demand for cooling increases from 4.8TWh to 64.9 TWh (for a level 3 population setting)

Level 3

Energy demand for cooling increases from 4.8TWh to 32.9 TWh (for a level 3 population setting)

Level 4

Energy demand for cooling decreases from 4.8TWh to 1.9 TWh (for a level 3 population setting). This is accomplished by better passive cooling, being more tolerant of hot temperatures and the use of fans to replace air conditioning units.

Figure 34.3: A commercial office building, Bangladesh

Interaction with other levers

A major heat source in offices is computers, the usage of which is controlled by "Commercial Lighting and Appliances". The population lever dictates how many office workers there are, which in turns sets the area to be cooled.