

BUILD IT GREEN

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Research question

How do green buildings help address the issues of excessive carbon dioxide emissions, temperature increase, pure water shortage, and energy wasted in providing fresh water using desalination plants?

Situation

Conventional buildings consume 39% of total energy use, 12% of water consumption, and 38% of CO₂ emissions. These buildings also have a negative effect on the natural environment, human health, and the economy [1]. Green buildings are constructions and designs that provide an opportunity to use resources such as energy, land, and material in a less disruptive way while providing a healthy environment.

CO₂ Emissions

Regular buildings consume 70% of all energy use, which results in 38% of total Carbon Dioxide (CO₂) emissions [2]. Figure 1 shows this problem in a graphic way. Resulting problems would include rising sea levels, more frequent floods, increased spread of infectious diseases, acid rain.

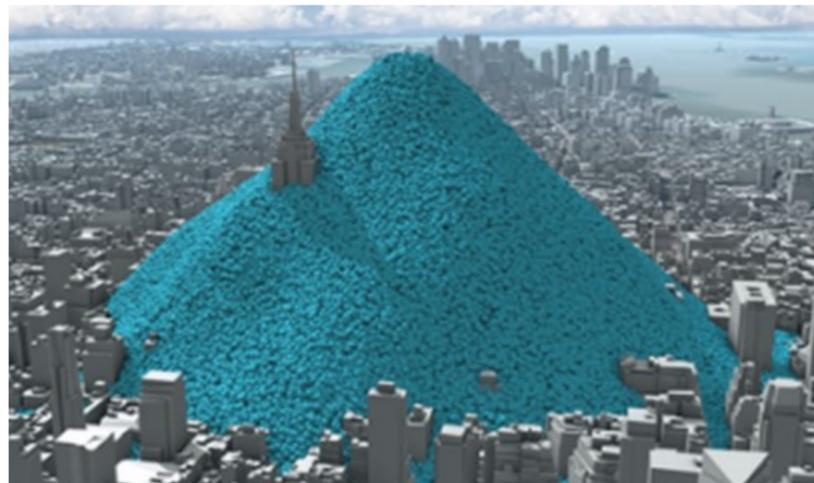


Figure 1: CO₂ Emissions New York City in one day [3]

Temperature

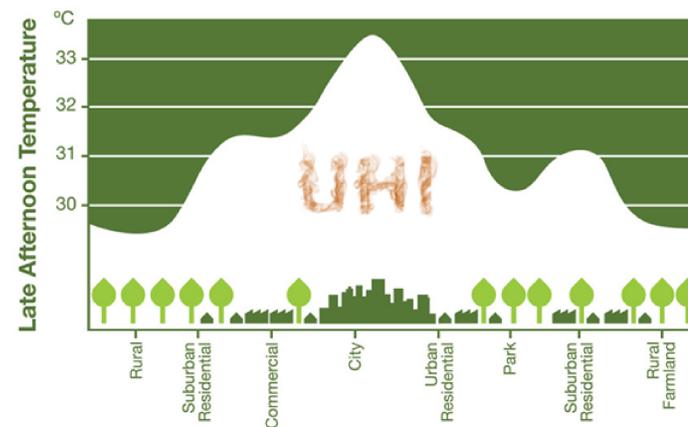


Figure 2: UHI Effect [4]

According to NASA's earth observatory, the average global temperature has increased significantly over the past 50 years [5]. One of the primary causes of this problem is the tendency of an urban area to be hotter than its surroundings; this phenomenon is called the Urban Heat Island effect (UHI). UHI effect is shown in Figure 2 which clearly depicts the different levels of temperature in different areas. The heat retention properties of skyscrapers and building materials such as low grade concrete and poor quality bricks are the main causes of UHI.

Pure Water Shortage

Desalination plants that are powered by natural resources are used nowadays to make fresh water out of sea water. Wasting of oil, land, and gas which are used to provide the required energy to operate the desalination plants and the pollution resulting damage to the environment is shown in Figure 3. Therefore, pure water shortages and pollution are now some of the most critical global problems.



Figure 3: Pollution caused by desalination plants [6]

Solutions

Green buildings will contrast with conventional buildings in design, construction, operation, and maintenance. Green buildings will consume up to 50% less energy than conventional buildings. This is equivalent to removing more than 1 million cars off the road every year [2]. Green buildings will address these issues by:

- Solar plates will generate electricity that will provide energy for desalination plants, thus reducing pollution levels and consumption of natural resources.
- The design of the building will increase light efficiency, and collect rain water through pervious pavements to be used later for irrigation and domestic use. Also, including sunshade devices will reduce the UHI effect.
- Using bio-based products to dispose building material waste will reduce CO₂ emissions and heat suppression.

Figure 4 shows the advantages of Green buildings and how they address the issues of CO₂, temperature increase, and pure water shortage.

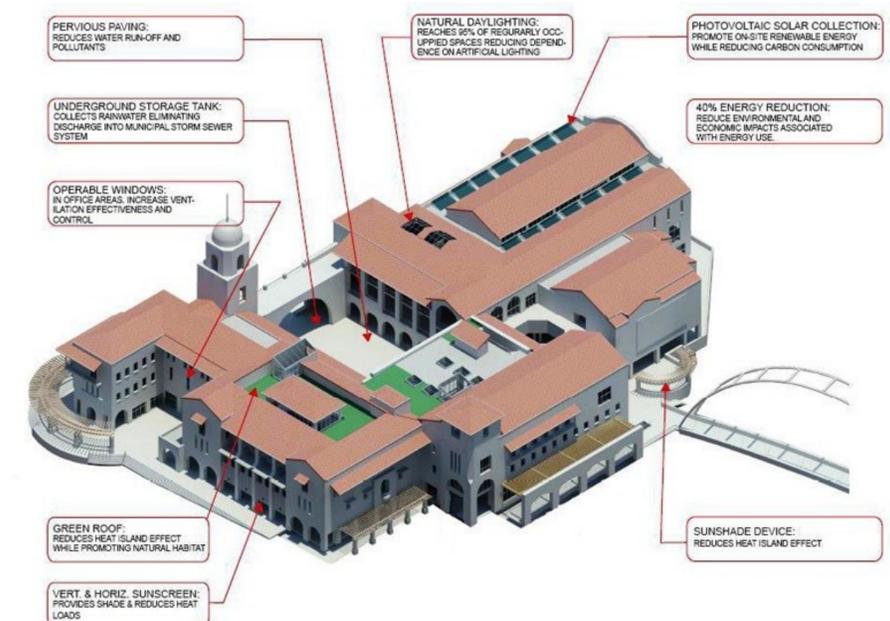


Figure 4: Green Building Design [7]

References

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