Air Purifying Billboard

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Introduction

Aims:

- To decrease future coming air pollution.
- According to Dr. Alena Bartonova, when population increases pollution increases as well.
- To increase awareness of pollution to residents.

Objective:

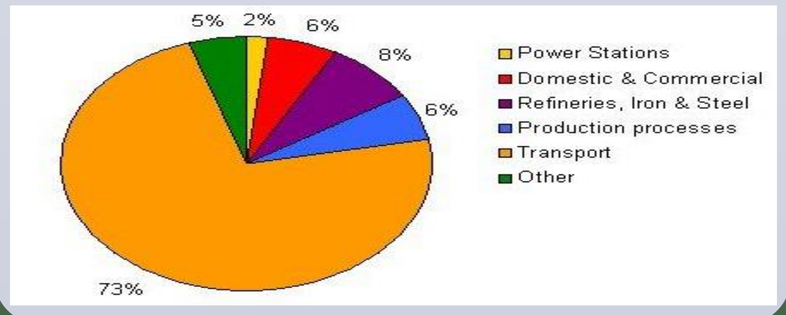
- To build an purifying billboard that will help us achieve our aims

Situation

- According to Dr A.F. Alhajji “the most urgent problem in GCC cities today is pollution”
- He mentions that 70% of air pollution in the GCC comes from transportation causes.
- Furthermore, he stresses that Slow cars cause more pollution that air pollution effects to schools, malls and universities.
- There are about 260,000 vehicles using Al Etihad Road every day.

Problem

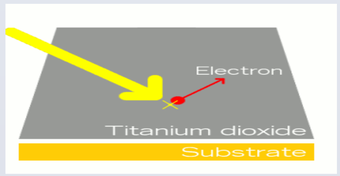
- According to Robin Mills, economical peek in the UAE increased population and development.
- Car emissions and construction sites are main contributors to air pollution.
- Increasing population means more cars which leads to more pollutants [30 to 40 percent of particulate matter comes from human activities].
- According to Jacqueline and Zainab, air pollution is the main contributor to premature mortality in UAE [650 annual deaths].



Solution

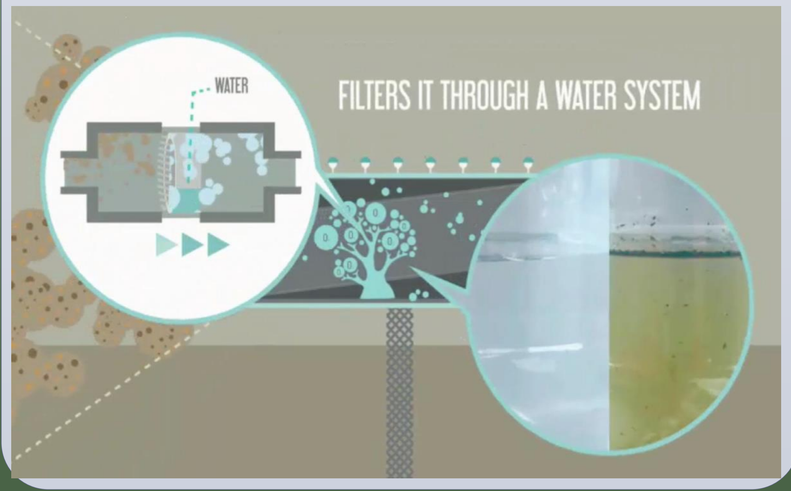
Photocatalytic Process

- According to Chris Woodford the light that is used in the photocatalytic process is the ultraviolet light, and the catalyst that is used is called titanium dioxide.
- A sheet of titanium dioxide will be covered on top of a substrate
- The ultraviolet light is going to shine on the substrate which leads the electrons to release on the surface of the substrate due to the high amount of energy reflected by the UV light as shown in figure 1.
- The electrons released are going to react with the water (humidity) in the air, and this reaction will produce hydroxyl radicals that are known in being highly reactive species.
- Hydroxyl radicals are going to attack the organic pollutant molecules by breaking apart their chemical bonds and turning them into harmless substances such as carbon dioxide and water as shown in figure 2.



Thermodynamic Process

- According to Matt Peckham, unpurified Air from the atmosphere enters the mechanism
- Basic thermodynamic principles are being applied
- Pollutants are left within the mechanism and purified air exists the mechanism
- According to Dr Orhan, the basic thermodynamic principles is related to the conservation of energy.



Evaluation

- According to the Matt Peckham, Air purifying billboard are easy to implement and maintain.
- Billboards could also serve to provide awareness, and other advertisement purposes.
- Highly efficient continuous process, with very low energy consumption (2.5 kilowatts of electricity per hour).
- Extends to a radius of five city blocks, behaves like 1,200 trees, benefiting residential and construction workers.
- The water used through the process is fully recyclable and can be used for other purposes.

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