

Project Report

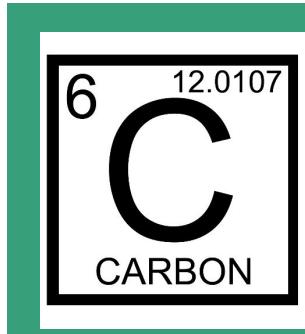
*"Approach to reduce carbon
emission"*

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BACKGROUND

An increase in carbon dioxide emission began when Industrialization (industrial revolution in 1750) took place along with population growth. Before this, the global average amount of carbon dioxide was about 280ppm. The global average atmospheric carbon dioxide in 2019 was 409.8 ppm. Human activities such as the burning of oil, coal and gas, as well as deforestation, are the primary cause of carbon dioxide concentrations in the atmosphere **(87 %) of all human-produced carbon dioxide emissions come from the burning of fossil fuels** like coal, natural gas, and oil. The remainder results from the **clearing of forests** and other land-use changes (9%), as well as some **industrial processes such as cement manufacturing** (4%).

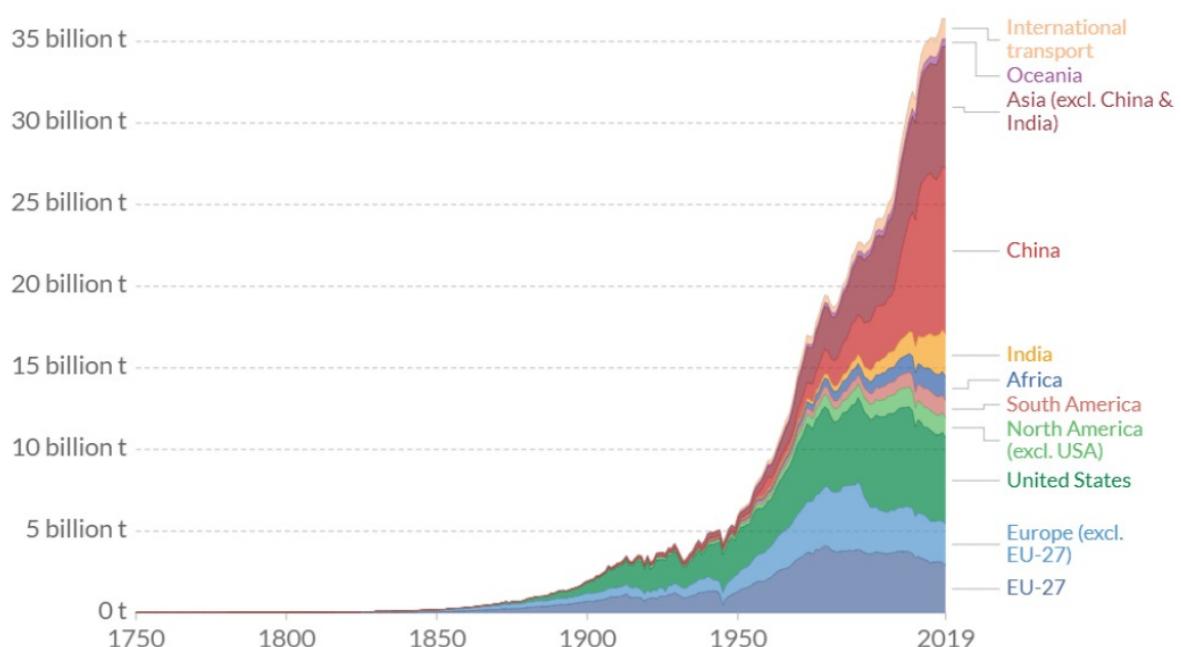
Carbon dioxide is a most important and long-lived greenhouse gas. It absorbs less heat per molecule than the greenhouse gases methane or nitrous oxide, but it's more abundant and it stays in the atmosphere much longer. And while carbon dioxide is less abundant and less powerful than water vapor on a molecule per molecule basis, it absorbs wavelengths of thermal energy that water vapor does not, which means it adds to the greenhouse effect uniquely. Increases in atmospheric carbon dioxide are responsible for about two-thirds of the total energy imbalance that is causing Earth's temperature to rise.

BACKGROUND

The interactive chart shows the breakdown of global CO₂ emissions by region.

We see that until well into the 20th century, global emissions were dominated by Europe and the United States. In 1900, more than 90% of emissions were produced in Europe or the US; even by 1950, they accounted for more than 85% of emissions each year.

But in recent decades this has changed significantly. In the second half of the 20th century we see a significant rise in emissions in the rest of the world, particularly across Asia, and most notably, China. The US and Europe now account for just under one-third of emissions.



Global Carbon Emissions to Rise by 1.5 Billion Tonnes in 2021 ...

3 weeks ago



OPINION

Global CO₂ emissions will continue to rise if we continue to burn fossil fuels

ET Energyworld.com

Coal plant pollution can cause 8,300 deaths in India

4 days ago



Time Magazine

Global Carbon Emissions Set for Second-Largest Annual Increase

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4 weeks ago

NBC NEWS

Carbon emissions in 2021 to pass pre-pandemic levels, report warns

4 weeks ago



ET Energyworld.com

Coal plant pollution can cause 8,300 deaths in India

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PROBLEM

**Climate change, forest fire, damaging sea levels
why are these increasing?
The answer is global warming!**

The increase of carbon dioxide in the atmosphere because of industries or fossil fuels or else is the major problem. If nothing changes, these climate changes will continue to increase.

There were so many experiments done to solve such problems. But some partially helped and some didn't.

Scientists say that the global temperature should be less than 1.5-2 degrees C. The only aim for the reduction of carbon dioxide is not to reduce the emission but also to remove and store it for some other purposes.

So the main aim is to reduce the carbon dioxide emission from the atmosphere using different methods which is beneficial for the environment and



SOLUTION



We have worked and found out some ways to solve these problems is the reducing amount of carbon dioxide from the atmosphere using different techniques.

Coral Reef

Like in a forest, much of the CO₂ absorbed in photosynthesis is decomposed and returned to the atmosphere. But there is an additional process unique to reefs: as corals build their calcium carbonate skeletons in a process known as calcification, they release CO₂.



Cotoneaster

Cotoneaster is one of the most versatile and interesting plants around. It turned out to be a “super-plant” that could act as a carbon sink for pollution. In comparison to the other plants in the study, cotoneaster was found to be 20% more effective in absorbing pollution. It's can absorb pollution on heavily trafficked roads.



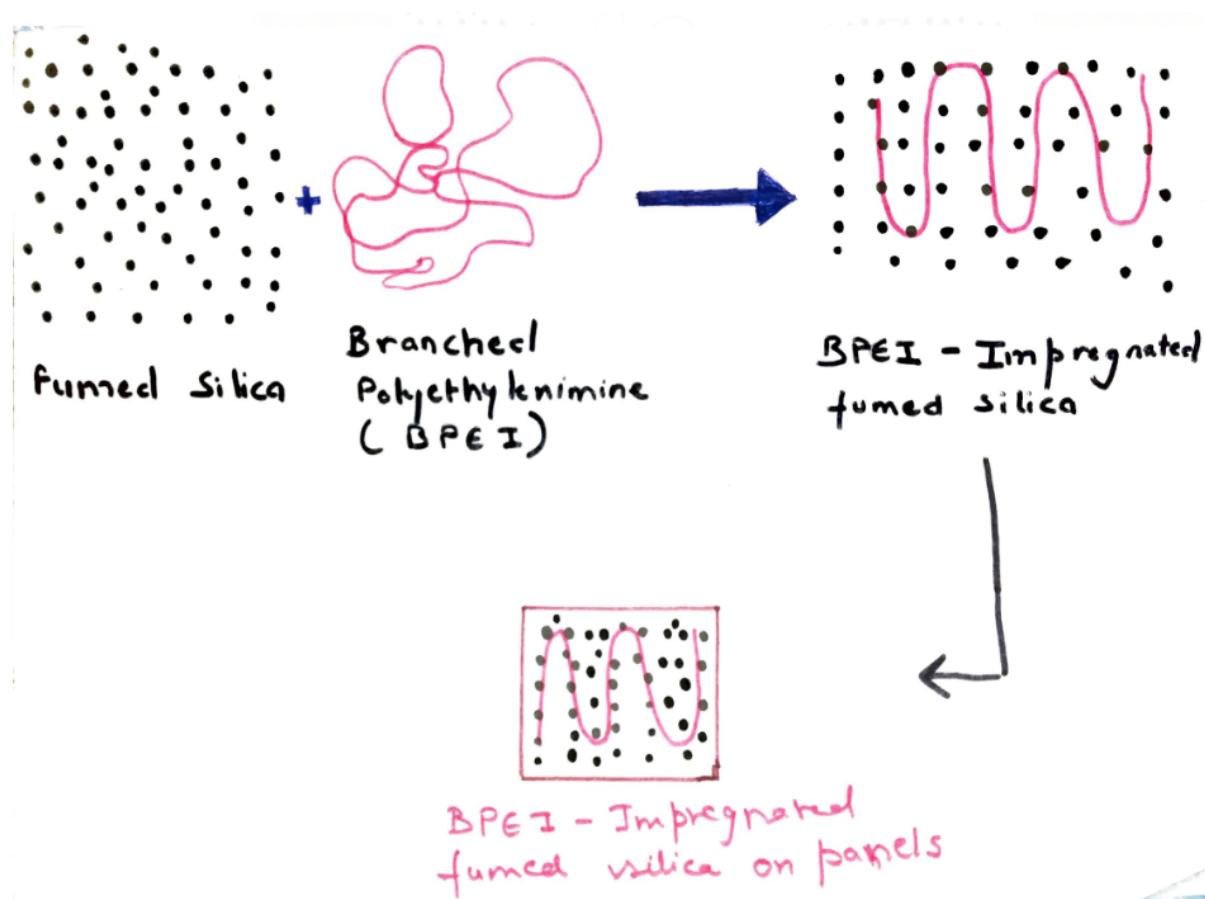
Carbon Absorption Panels

A technique by which the industrial emission of carbon dioxide gets captured and stored.

Researchers used the following material in the recent study which can absorb carbon dioxide from both dry air and humid air.

- Fumed silica
- Polyethyleneimine

In the fig, they took fumed silica and branched polyethyleneimine(BPEI) as a raw material. Through the process of chemical and mechanical, resulting in the formation of BPEI impregnated with the fumed silica.



TO BE CONTINUED



From all the discussions and studies we propose an idea to take an active part in reducing carbon emission.

The concept is to enhance the ability of carbon absorption panels to absorb more carbon dioxide released from an industry. We will introduce the property of a plant called **Cotoneaster Horizontalis** into the carbon absorption panel.

Cotoneaster Horizontalis is a plant that is more efficient in absorbing carbon dioxide and has hair-like structures on its body. These hair-like structures are mostly present in the leaves of plants and are responsible for absorbing 20 percent more carbon dioxide in comparison to other plants.

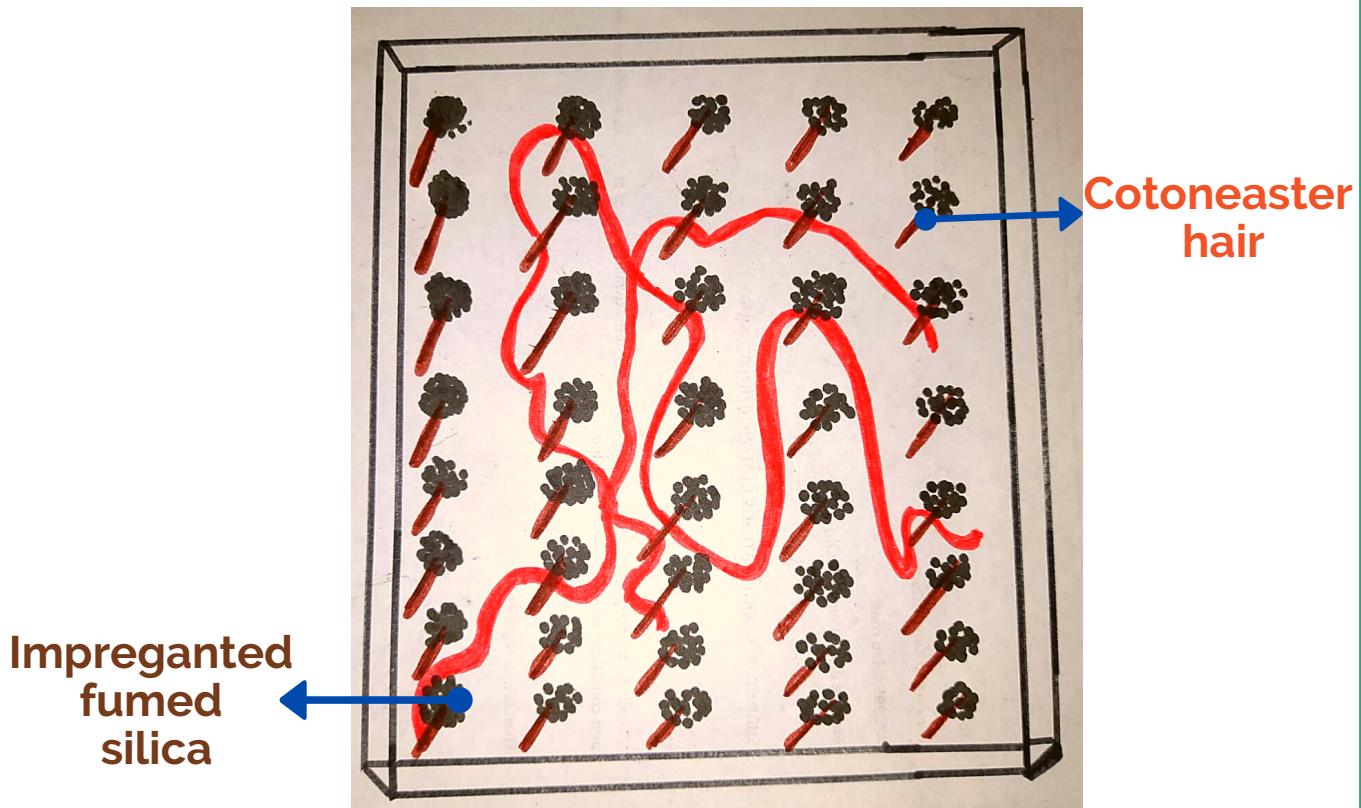
The hair-like structure made from the composition of different compounds. The compounds responsible for these structures: isoquercitrin, hyperoside, quercitrin, rutin, quercetin 3-O-(2"-O-xylosyl)galactoside, quercetin 3-O-glucoside-7-O-rhamnoside, quercetin rhamnoside-hexoside, kaempferol rhamnoside-hexoside, quercetin di rhamnoside, (-)-epicatechin, procyanidins B2 and C1, procyanidin tetramer B-type.

However, this plant is in the latest trend in research so the researchers don't have proper details of compounds associated with them but they feel that the above compound is responsible for leaves so they are also responsible for hair-like structures in leaves.



We use the composition of compounds of a plant with the fumed silica impregnated with polyethylenimine (a polymer) - present in the carbon absorption panel and make artificial structures in the panel. Fumed silica and polyethylenimine are the main constituents in carbon absorption panels for absorbing carbon dioxide. These artificially made structures in the panel would work the same as hair structures in plant *Cotoneaster Horizontalis*.

As a result, enhancement of the ability to absorb carbon dioxide from the surrounding environment.





FUTURE USE

As technology is changing we are getting many new innovations done, with these there is also an increase in emission of carbon dioxide which should be under control using such innovations.

Increasing carbon dioxide resulted in many problems which had to be solved. The use of carbon dioxide should be lowered. But these industries use and emit gases and the transportations which all results in pollution.

So to overcome the issue we thought of using a cotoneaster and carbon absorption panel which will be useful to control the emission of carbon. As we mentioned earlier about the properties and how it's useful in controlling carbon dioxide.

This will help to lower the emission of carbon dioxide in the air.

- Can be used or placed in heavy traffic areas which helps in limiting the emission of carbon released by large numbers of vehicles.
- These can be used in industries after the purification process from which it can absorb more carbon.
- Further, it can also be used above the house if the device is made small and easy to attach.

As these will be helpful in controlling the carbon, slowly there will be a decrease in the pollution and the climate would be under control.

CONCLUSION



Using the ideas mentioned in this report we can help reduce the emission. So, that we could get a better life.

The three important things we used for our project is:-

- **Fumed Silica**
- **Polyethyleneimine**
- **Cotoneaster**

Using fumed silica and polyethyleneimine for absorbing carbon was done and researched previously but have not been implemented practically. Using cotoneaster in it is an important part of our research.

These three are impregnated to a panel called carbon absorption panel. The carbon absorption panel consists of cotoneaster's hair and BPEI(fumed silica+branched polyethyleneimine).

The idea of making carbon absorption panel is a **hypothetical approach**. We tend to take it forward to make it more better with more research and equipment practically.

This absorption panel is made to be used where there is more pollution i.e.

- In urban areas with more traffic,
- Industrial area, a
- Also as a small device in households.

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