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Dhaka's overwhelming air pollution about to end: Infraestructures that absorb air pollution as a new proposal

Picture this; among one of the most contaminated cities in the world, where in every single corner, cultural and historical heritage is visible, everything is covered by thick layers of smog. This being covered doesn't allow tourists and residents to appreciate the immense ancient history that this South Asian country has. What cannot be left aside is the fact that this air-contamination forbids the almost 24 million people that live in the greater metropolitan area to live a long and healthy life and do normal things like being able to go out to the street with no fear of the possibility of falling somewhere because their lungs could no longer resist or simply being able to breathe freely without feeling the lack of oxygen. (Ydeng, 2024)
This is an average day of a Bangladeshi citizen, not only in Dhaka but in most parts of the country.

Figure 1.Photography of the smog and air condition in Dhaka, Bangladesh. Najbus Sakib, SM.(2021, March 30). Bangladesh, Air pollution engulfs lives, environment. Anadolu Ajansi. https://cdnuploads.aa.com.tr/uploads/Contents/2021/03/28/thumbs_b_c_7960d900f0514f7b55e9bd954ad05f19.jpg?v=102720

Urban pollution is something that affects the population of greater metropolitan areas of many countries around the world. This is the case of Dhaka, the capital of Bangladesh. One of the most polluted cities in the world where year after year, dozens of people contract respiratory diseases or even die because of them.
Bangladesh is not only one of the most polluted countries all over the planet, but it is one of the more overpopulated countries.
In just 148.460km², more than 170 million people live. Only 31% of Bangladesh population live in urban areas and the other 69% reside in rural areas where the air-contamination statistics are also critical.
Dhaka is the largest city of Bangladesh which is located in South Asia. It has immense historical and cultural heritage, but over the years it has been affected by human activity, specifically because of vehicle emissions, industrial discharges and the widespread use of kilns to produce bricks. Although

the government has not provided an index as such of pollution parameters, studies have shown that it comes mainly from the absence of stringent environmental regulations and enforcement.

The World Health Organization (WHO) guideline for pollution is 5 µg/m³ for PM2.5 (Particulate Matter). Bangladesh, being ranked as the most polluted country in 2023 according to the World Bank and the Centre for Research on Energy and Clean Air, has the impressive levels of PM2.5 concentration of 79.9 µg/m³ in an annual average.
In winter months, the concentration is even worse, reaching 165.5 µg/m³. (Chakraborty, 2025)

Figure 2.Photography of a passer-by breathing in the extremely polluted air in Dhaka, Bangladesh. File Photo.(2024, October 4). Air pollution in Dhaka reaches alarming level: Research. UNB Dhaka. https://en.prothomalo.com/environment/pollution/e380zmbv3h

This level of air-contamination converts to an important decrease in life expectancy, and increases rapidly the probabilities of having lung cancer among other irreversible respiratory conditions that affect almost 74 million people in the metropolitan area of Dhaka and the district of Chittagong.These regions of Bangladesh are on track of reducing the life expectancy up to 7.6 years, on average relative to the WHO guidelines. (*Bangladesh - AQLI*, 2024)
The number of people who die each year due to multiple factors derived from pollution is 272,000. A number that is constantly increasing year after year (Newsroom, 2024).
The numbers state that 59% of Bangladesh energy derives from natural gas, 31% from oil and 10% from coal. In actual days, renewables are not an option because of the unmeasured use of coal that has led to the alarmant statistics of the already deteriorated Dhaka's air. Although natural gas emits carbon dioxide, it produces far fewer particles than coal. (Ydeng, 2024)
Even with all these disappointing numbers, the government and humanity can still regain control of this terrible situation that has affected, is affecting, and will be affecting Bangladeshis for the following years if we do not urge International Organizations that can serve as sponsorships to provide solutions that can be beneficial for Bangladesh and for its population.
Water and air pollution worsened in the last 10 years because of the rapid population growth and subsequently the unplanned urbanization. This has led Dhaka's residents to deal with the strain on the availability of resources and infrastructure. (UNB & UNB, 2024)

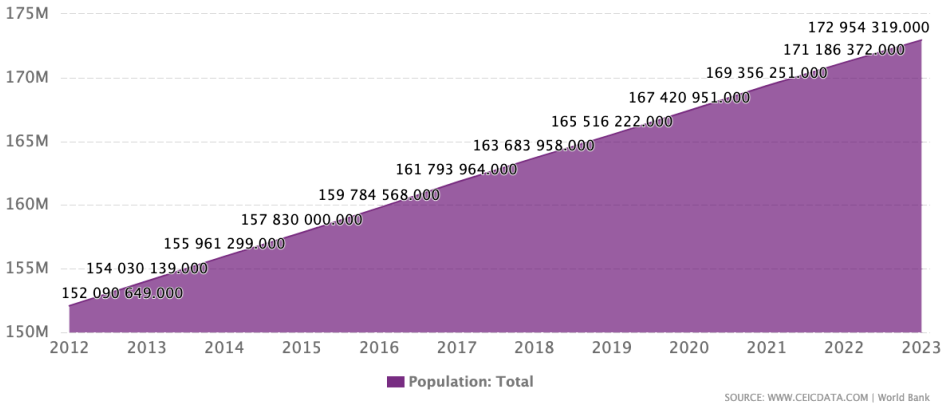

Figure 3.*The demographic of the population increases in Bangladesh*.
CEICdata.com.(2021).Bangladesh BD: Population: Total
https://www.ceicdata.com/en/bangladesh/population-and-urbanization-statistics/bd-population-total

This overwhelming graphic of the rapid increase of population in Bangladesh from the last 10 years shows the significant challenges this increase has brought to public health and the risks to the public health that this implies.

In major cities such as Dhaka or New Delhi in India, over 50% of air pollution is transboundary. The polluted air can travel from 200 km to 500 km, either from a neighboring city or even from a neighboring country.
Dr. Shahriar Hossain, who is an environmental expert, in collaboration with Anadolu Agency referred to a recent field as the following: “Transboundary flow of air contributes the majority of the airborne pollutants that can travel long distances and cause unwanted air quality degradation”.
In addition, he showed his worry especially if it was in a small country such as Bangladesh, which is surrounded by highly polluted cities and countries like India and Nepal.

Due to the unplanned urbanization that the city of Dhaka had in the last two decades, and with the increase in population, there are limited green spaces and inadequate waste management systems, among other factors like socioeconomic disparities and health risks that have led all Dhaka residents to live in a precarious situation.

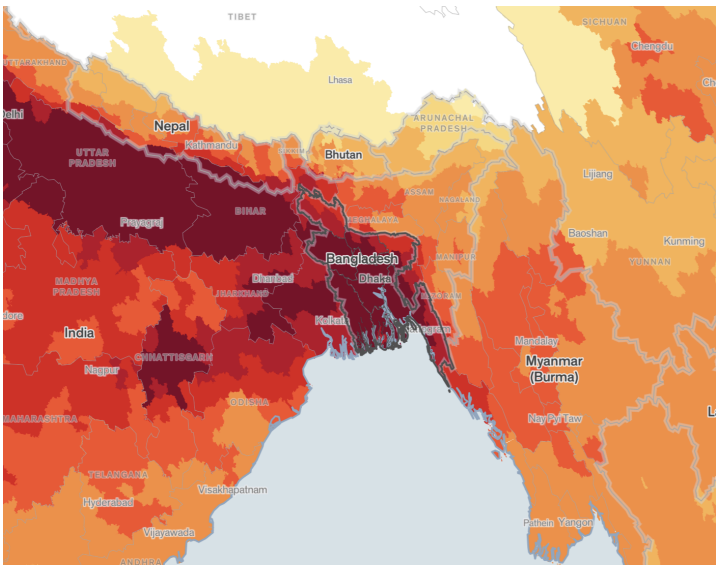

Figure 4.*South Asia air pollution spotlight*. AQLI.(2023, August 28).Country Spotlight: Bangladesh https://aqli.epic.uchicago.edu/country-spotlight/bangladesh/

This is the map of air-contamination levels of 2023 in the South Asian region, where Bangladesh is located among other neighboring countries like Myanmar, Bhutan, India and Nepal that also suffer from the same problem.

Over the years, Dhaka's residents have witnessed various attempts to reduce air pollution concentrations, most of them with a disappointing result or just left as a politicized promise.
For instance, the government proposals such as the draft of a Clean Air Act, the National Air Quality Management Plan or even international organizations like Climate and Clear Air Condition (CCAC) have intervened on several occasions to seek a long term solution for the mitigation of air pollution. However, none has ever given favorable results, due to the lack of clear data, the COVID-19 pandemic where the Bangladeshi government had to focus its attention on other crucial issues that the country was facing, or even the kilns industries or the companies that did not comply with certain regulations and that are directly linked with internal government corruption.

Some of the barriers that the Bangladeshi government need to overcome are:

- Limited indigenous renewable energy resources
- High cost of nuclear energy
- Lack of budget for enforcement policies (Regulation to existing norms)
- Limited Monitoring Capacity

Among other factors that contribute to being an obstacle when dealing with air pollution.
Multiple strategies have been proposed in the last 30 years to try to counter the negative effects of the industrial discharge among other factors, but none has given positive results. But I truly believe that with the collaboration and the will to do something, we can overcome this severe crisis, starting with the citizens, that we can pressure the government to take action by making little actions.
As a good example, it would be: Information Campaigns, where the aim here is to raise awareness about the crisis and encourage people, little by little, to start with small actions that at the end, they would convert into a big change.

Implementing any solution in Bangladesh will be very difficult but not impossible. For example, in April 2025, the DNCC (Dhaka North City Corporation) announced that they will be implementing 50 air purifiers around industrial areas of Dhaka, as a measure to combat the high levels of air pollution concentration. Each device has the capacity to clean the air equivalent to the work of approximately 85 trees. (*Dhaka North plans 50 air purifiers to curb air pollution: Expert says it won't be effective*, 2025)

Experts said that this was going to be financed by corporate social responsibility sponsorships so that the Bangladeshi government would not have to pay anything and thus not divert its attention from other things of equal importance.

Nevertheless, the project did not prosper because of the counter arguments that experts have about urban planning and air quality where they expressed their commotion that this purifiers will have limited effectiveness in open areas due to the air flow, which reduces the possibility of achieving the goal, to reduce CO2 levels in the Bangladeshi capital. ("Air purifier" to be installed in Dhaka: DNCC, 2025)

Adding the difficulties involved in having this type of technology in a city that unfortunately is neither adapted nor prepared.

Some good examples not mentioned before are the underdeveloped waste and energy infrastructure and the difficulty of the government to balance economic growth with environmental protection. (Umali-Deininger, 2024)

Can the population imagine that there is a German technology that, with the help of titanium dioxide, among other materials, could absorb pollution through a structure that can be adapted to any property?

Having in mind that German technologies nowadays is one of the most advanced technologies in the entire world, Germany's mature industrial base is fostering innovation in certain areas like particulate matter control, NOx reduction, among others is making it into one of the promises for the green building solutions.

Here is where I would like to introduce my proposal that has been implemented already in other polluted cities like Mexico City, and the results are impressive.

The structure of these walls has the shape of a honeycomb with "pores" and "tissues" and is capable of carrying out a photosynthetic process very similar to that of trees.

The material it has, exchanges hydrogen from the air for oxygen, which is a very convenient exchange for a city with so many cars.

The following picture shows the hospital's infrastructure :

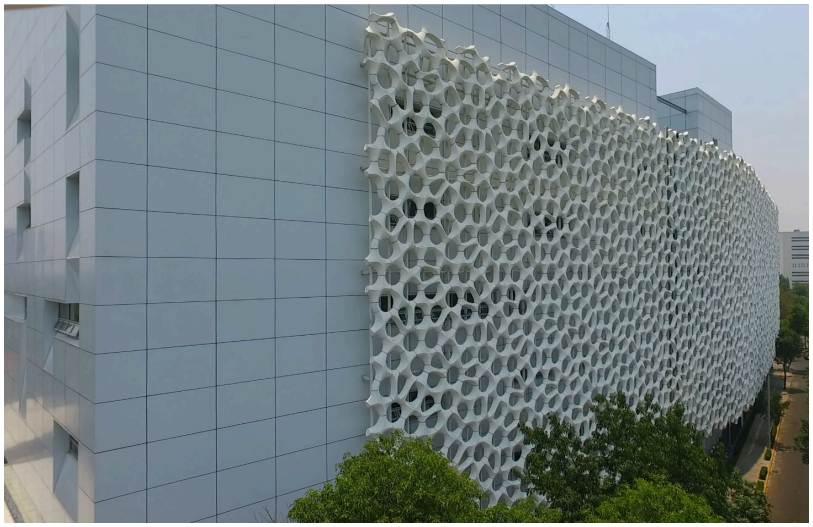

Figure 5.*Hospital General Dr. Manuel Gea González*. LinkedIn.(2024, September 17).LinkedIn.com: GEA Hospital https://mx.linkedin.com/company/geahospital

Our aim with this proposal is to make a notable difference not just in Dhaka, but in the whole country. Mexico City, my home city, can be taken as a good example, where thirty years ago, the metropolis experienced unprecedented levels of pollution that even led to various deaths among the population and vast numbers of people suffering from respiratory diseases. Now, the city has reduced air pollution levels in a staggering way, despite all the factors that can determine this. (*Live in Mexico City? Here's what you need to know about air quality*, 2024)

I deeply believe that the only thing missing in Bangladesh and other polluted countries is the willingness to take things seriously, as previously said, from the people, and from the government.

As for how to sponsor this proposal, I thought about multiple organisms that might help the cause, such as the Climate and Clean Air Coalition (CCAC). The main aim of this organism is to reduce short-lived pollutants in over 65 countries, improving air quality and mitigating negative effects of climate change.

The UNDP (United Nations Development Program)-Climate Promise that provides aid by giving experts and urban solutions climate smart. (Environment, 2017).

The price for this project will be a little high but it is still affordable, taking into account the materials used and that the results will be effective in the long term.

The plan is to invest in Hazaribagh where the highest sources of pollution occur in the city due to multiple factors already mentioned.

Initially, the total cost of the project would be 380,000 USD per property. Labor costs are already included for air quality investigation, design and structural engineering, maintenance for 3 years and most importantly, the titanium dioxide panels which cost $90 USD per m2.

Affected countries such as those in South Asia should consider it an investment and not as an expense hence millions of people will be helped.

If the project is effective, we could think first about scaling it at national level and then at an international one.

In the next table we can see a comparison of air purifiers and the sustainable structure of titanium dioxide:

Table 1. Comparison of two possible solutions to face air pollution in the neighbourhood of Hazaribagh in Dhaka, Bangladesh (Rawat & Kumar, 2023)

Aspects	Air pollution absorbing infrastructure	Air purifiers
Environmental Impact	Positive, it absorbs the CO2 levels and reduce temperature	It can be negative if it isn't powered by renewable energies
Initial cost	High (Specialized engineers,	Variable, depending on the area

	materials like titanium dioxide,etc)	where the purifier is located due to multiple factors.
Coverage	Low and depending on the area (medium)*. *In regions where the weather is uncertain like too dry, or too cold the maintenance coverage would be necessary, in order to prevent related issues with humidity,etc.)	High, it needs electricity, regular cleaning if necessary and filter replacements
Scalability	It can be implemented in long-term urban projects	Useful for specific areas but very difficult to implement throughout the city of Dhaka at low costs

Having researched air pollution in Dhaka and proposed a solution based on new German technologies, has completely transformed my perspective on what happened in the world, as well as how we play our role in solving it.

Governments, citizens, local and international organizations, should be involved in the call to action, remembering that each one of us take part in this important movement, that is, to preserve our vast biodiversity, leaving aside socioeconomic and social conditions, and that at the last, the strains we all may be suffering from this awesome planet, are caused because of anthropogenic activities.

As a young man from Mexico City, this project in my opinion is one of those innovative ideas that knows no borders. The proposed technology will not only be able to clean the air in one of the most polluted cities in the world, but also invite other countries to take an action plan, including my own, Mexico.

Looking for solutions that are sustainable and their impact is long-term with real solutions is crucial and urgent to do something about it.

In a world as interconnected as the one we live in, cleaning the air in Dhaka could be the first step in what could be a transition for humanity. Because at the end of the day, improving the world is within us and begins with daring new challenges and acting.

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