Committee: Environmental Commission

Issue: Regulating the footprint of black carbon emissions

Student Officer: Katerina Georgopoulou

Position: Deputy President

PERSONAL INTRODUCTION

Dear delegates,

My name is Katerina Georgopoulou, and I have the utmost honor of serving as one of the Deputy Presidents of the Environmental Commission in the 5th ACGMUN conference. I am 15 years old and currently attending the 10th Grade at the German School of Athens / Deutsche Schule Athen (DSA). I am also really looking forward to my second time chairing.

My MUN career started in 2019 and so far, I have participated in seven conferences. Each and every conference has been unique and has offered me great knowledge of the current affairs around the globe. MUN also allows people to come in contact with others, share their ideas and exchange viewpoints upon several topics.

In this study guide, you will find a generalized approach to the topic. Regulating the footprint of black carbon emissions is a topic of great importance. I would like to remind you that you are highly encouraged to conduct research on the aforementioned topic on your own as well. When doing so you are highly urged to search for information concerning your delegation's policy.

If you happen to have any questions, feel free to contact me at any time through my email (attached below). I look forward to meeting and working with you all soon!

Best regards,

Katerina Georgopoulou

Email: katerinageorgopoulou14@gmail.com

TOPIC INTRODUCTION

Over recent years a predicament regarding the regulation of the footprint of black carbon emotions has been increasingly present. A rising body of research suggests that dust and smoke from fuel-burning are substantial factors to climate change during the previous decade. Dust contains Black Carbon (BC), which is a powerful climate driver that has the ability to absorb sunlight in the atmosphere. International authorities have difficulty when it comes to black carbon emissions from aeronautical vehicles. This method of transportation is still in its early stages, but it is expected to increase rapidly. Black carbon emissions are a serious environmental issue that has adverse consequences on human health as well as our climate.

Indoor cooking burners are responsible for about 2 million deaths[1] per year globally, according to the World Health Organization (WHO). More people die each year as a result of this than die as a result of malaria. Burning wood or coal in a stove produces a lot of black carbon. Pollutants, which include black carbon, have an impact on global and local temperature levels and are related to a number of negative health impacts, including premature mortality. They can also speed up the melting of snow and ice in the cryosphere; and therefore, can disturb water cycles and start reducing agriculture production. In the year 2000, the most recent year in which a consistent worldwide inventory is available, roughly 8,400[2] of black carbon was released into the atmosphere. Particularly in developing nations, details on exact locations and time of BC emission estimations are unknown. However, current calculations based on atmospheric data allow for large-scale estimations of the principal worldwide sources of black carbon emissions by location and sector. Around 75 per cent of worldwide BC emissions come from Asia and Africa. Household solid fuel combustion is the primary polluting sector in less developed nations, whereas transportation dominates in industrialized countries and industrial usage of coal. Climate change which is occurring, is mostly due to human actions, and will have several significant and potentially harmful consequences in the coming decades. As a response, global leaders have convened several times in the last decade to agree on goals and tactics for dealing with the problem. The US Congress has proposed climate legislation, and

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[1] *"Household Air Pollution and Health." World Health Organization, World Health Organization, Household air pollution and health (who.int)*

[2] *Bounding the Role of Black Carbon ... - Wiley Online Library. Bounding the role of black carbon in the climate system: A scientific assessment - Bond - 2013 - Journal of Geophysical Research: Atmospheres - Wiley Online Library*

even a number of states are developing climate policies. The majority of climate strategy creation and analysis has concentrated on lowering CO2 from the atmosphere and other air pollutants including black carbon.

DEFINITION OF KEY TERMS

Acid Rain

Acid rain, also known as acid deposition, is a general phrase that refers to any type of fall that contains acidic particles, such as nitric or sulfuric acid, that seeps into the ground. This can include acidic rain, fog, snowfall or even dust.[3]

Black Carbon

Black Carbon (BC) is a "black substance consisting wholly or principally of carbon obtained usually as soot and used especially in tires and as pigments". Pure carbon in numerous connected forms makes up black carbon. It is one of the primary forms of particles in both anthropogenic and naturally occurring soot, and it is created by the incomplete combusting of fossil fuels, biofuels, and biomass. [4]

Climate Change

A long-term shift in the normal weather conditions that have taken place in recent years Earth's local, regional, and global climates is referred to as climate change. These modifications have a wide variety of impacts.[5]

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[3] *EPA, Environmental Protection Agency, What is Acid Rain? | US EPA*

[4] *Webster , Meriam. "Carbon Black Definition & Meaning." Merriam-Webster, Merriam-Webster, https://www.merriam-webster.com/dictionary/carbon%20black.*

[5] *Shaftel, Holly. "Overview: Weather, Global Warming and Climate Change." NASA, NASA, 24 Aug. 2021, https://climate.nasa.gov/resources/global-warming-vs-climate-change/. Global Warming vs. Climate Change | Resources – Climate Change: Vital Signs of the Planet (nasa.gov)*

Fossil fuels

Because they were generated from the petrified, buried remnants of living organisms that existed millions of years ago coal and gas are all called fossil fuels. The carbon contained in the aforementioned fuels is really high due to their origins.[6]

Greenhouse Effect

The greenhouse effect occurs when greenhouse gases (air pollutants, i.e. Carbon Dioxide, Methane, and more) in the atmosphere absorb heat from the sun and reflect it to the Earth instead of allowing it to escape. This could lead to further global warming. [7]

Greenhouse Gases

Greenhouse gases are gases that have the ability trap heat in the atmosphere. They let sunlight to travel through the atmosphere, but they trap heat generated by the sunshine from escaping. The following are the most common greenhouse gases: Vaporized water. Carbon dioxide and with-it BC are greenhouse gases. [8]

BACKGROUND INFORMATION

Properties of Black Carbon

BC is the general term for a variety of hydrocarbon compounds ranging from partially charred plant leftovers to highly graphitized dust that is produced by incomplete combustion of fossils fuels in the lack of oxygen. BC can have a variety of impacts on the environment at global scales, according to its form, state of source and preservation and neighboring environmental circumstances. Due to the fact that

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[6] *June 29, 2018 Melissa Denchak. "Fossil Fuels: The Dirty Facts." NRDC, 8 Feb. 2022, Fossil Fuels: The Dirty Facts | NRDC*

[7] *"Greenhouse Effect." Department of Agriculture, Water and the Environment, Department of Agriculture, Water and the Environment Creative Commons License, www.environment.gov.au/climate-change/climate-science-data/climate-science/greenhouse-effect. Greenhouse effect | Department of Agriculture, Water and the Environment*

[8] *Webster , Meriam. "Carbon Black Definition & Meaning." Merriam-Webster, Merriam-Webster, Meet the Greenhouse Gases! | NASA Climate Kids*

it can absorb sunlight and heat the atmosphere, generating a positive solar activity of climate, BC aerosols are intensively studied components of atmospheric aerosol.

Impacts of BC

As mentioned above BC together with more greenhouse gases contribute to several factors of both the environment, the ecosystem and human health.

Impacts on the environment

Since it's so efficient at absorbing sunlight and heating its surrounding, BC is a significant contribution to global warming. BC seems to have a 460-1,500[9] times higher heat effect on the climate per mass than Carbon dioxide. BC, when maintained in the atmosphere, contributes to global warming by turning solar energy into heat. It also has an impact on cloud formation and rain patterns. Black carbon and co-emitted particles lower the albedo surface (the ability to reflect sunlight) and heat the area when placed on snow and ice. As a result, the structure of the Arctic and the Himalayas makes it easier for such places to be particularly prone to melting. In general, BC concentrations in mid-latitude snow and ice are one to two orders of magnitude greater than those in polar areas. Due to BC buildup throughout the melting season, BC concentrations in aged snow and granular ice in the ablation sections of alpine glaciers are one to three orders of magnitude greater than those in new snow or snow pits in the glacier accumulation areas. Like all atmospheric particles, black carbon impacts cloud solidity, reflectivity, and durability, as well as moisture. It has varying impacts depending on just how much smoke is in the air and where BC is in the atmosphere. It will dissipate clouds if it absorbs heat at the height where they are formed. It helps to stabilize lower stratocumulus clouds that hide the sun and hence has a cooling impact when it rests above them. Snow-covered areas are the most sensitive to black carbon's warming impacts, and any particles that reach there, especially those that are darker than snow, are a worry since they can diminish reflectivity and hasten to melt. As the Arctic Sea ice melts, shipping will increase in the region, increasing the chances that black carbon emissions from ships burning heavy fuel will rise in the future.

[9] *Changes in Atmospheric Constituents and in ... - IPCC.* *Chapter.2_FINAL.indd (ipcc.ch)*

Possible health implications

BC is a substantial contributor towards the fine particle (PM2.5) load in the air. It is tiny enough to be breathed easily into the lungs and has already been linked to negative health consequences. Household and ambient (outdoor) PM2.5 air pollution are responsible for an estimated 7 million premature deaths per year[10]. The question of whether black carbon is hazardous in and of itself or serves as a marker for additional co-pollutants is now being debated. However, black carbon is firmly linked to asthma and other respiratory issues, as well as low birth rates, heart attacks, and lung cancer. When lung tissue samples from coal miners, smokers, and nonsmokers are analyzed, correlations and predictions between exposure and the probability of bad lung outcomes may be drawn. Coughing can be caused by inhaling carbon black particles, which irritate the lungs. The eyes, nose, and throat can all be irritated by black carbon. When humans are exposed to high quantities of black carbon for an extended period of time, the particles can become lodged deep in their lungs. If it persists in the lungs, it can cause bronchitis and eventually become a chronic illness. There are no medical tests that can validate short-term exposures to black carbon on a regular basis. A chest x-ray may be ordered for people who have been exposed for a long time. The x-ray, when reviewed by an expert, can reveal if lung damage has occurred.

Sources of black carbon emissions

Diesel fuel is the most significant source of black carbon in developed countries such as the United States. There are four primary sources of black carbon emissions. To begin, diesel engines for transportation and industrial usage are one of the most significant ones. Diesel engine emissions lead to the formation of ground-level ozone, which is harmful to crops, trees, and other plants. Acid rain is also created, which has an impact on land, lakes, and streams, as well as entering the food chain through water, produce, meat, and fish. Additionally, home solid fuels like wood and coal, as well as open forest and savanna fires, are sources of BC.

[10] *"Household Air Pollution and Health." World Health Organization, World Health Organization, Household air pollution and health (who.int)*

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

United States of America (USA)

The United States is responsible for around 8% of worldwide black carbon emissions, with diesel engines, biomass burning (including wildfires), home heating, and industry accounting for the majority. Due to the warmth caused by U.S. soot surpasses that caused by either methane or nitrous oxide, biofuel soot might be the second greatest source of global warming emissions in the United States. The net warming impact of black carbon on the Arctic will decline as snow and ice surfaces continue to thaw, melt, darken, and lose contrast with black carbon. As a result, lowering black carbon today will have a greater impact than waiting reductions in the future. The US President, Joe Biden is determined to reduce greenhouse emissions by 50-52%[11] below 2005 levels by 2030, attaining a carbon-free power sector by 2035, and building a net-zero economy by 2050. All of that will happen while he will generate union jobs at home and good-paying.

China

On a worldwide scale, China's black carbon emissions are significant: from 1990 to 2007, it accounted for 20 to 24[12] per cent of total global emissions, being the largest share. The use of biomass, coal, or oil for cooking and heating in the household and industrial sectors, diesel transportation, and open agricultural burning are the primary sources of black carbon emissions in China. These emissions were continuously dropping from 2010 to 2017, however, data from 2019 reveals a 3.3% rise in coal use over the previous year, implying an increase in related black carbon emissions. According to these statistics, whatever actions China takes to reduce its black carbon emissions would have a big influence on the world climate and the Arctic.

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[11] *"ICYMI: President Biden Signs Executive Order Catalyzing America's Clean Energy Economy through Federal Sustainability." The White House, The United States Government, 13 Dec. 2021, ICYMI: President Biden Signs Executive Order Catalyzing America's Clean Energy Economy Through Federal Sustainability | The White House*

[12] *A Review of Trends and Drivers of ... - Institute of Physics. A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018 - IOPscience*

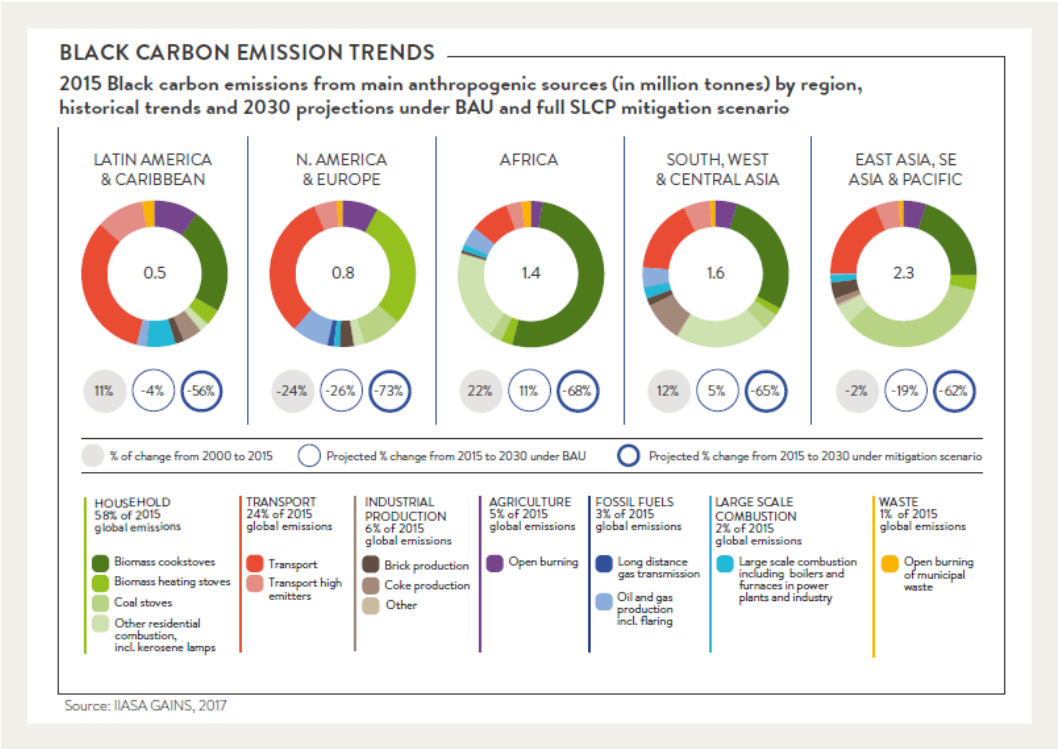

Figure 1[13]**:** Sources of BC on a worldwide scale

The International Maritime Organization (IMO)

IMO or the International Maritime Organization "is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships." [14] Moreover, it is the global standard-setting authority for the safety, security, and environmental performance of international shipping. It is a specialized agency of the United Nations. Its primary goal is to provide a fair and effective regulatory framework for the shipping sector that is generally adopted and enforced. Recently, the International Maritime Organization (IMO) passed a non-binding resolution to limit Arctic black carbon emissions. The initiatives are focused on reducing the amount of dangerous particulate matter emitted by ships passing through the Arctic. Flag states are required to encourage boats to transition to lighter, distillate fuels and phase out

[13] *Graph of the Global Environment Facility's Scientific and Technical Advisory Panel, and World Health Organization (WHO). "Black Carbon." Climate & Clean Air Coalition, 1 Jan. 1970, Black carbon | Climate & Clean Air Coalition (ccacoalition.org)*

[14] *International Maritime Organization, International Maritime Organization, International Maritime Organization (imo.org)*

heavy fuel oils under the optional measures. Lighter fuels burn cleaner and produce less black carbon, or soot, in the smokestack of a ship.

Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC)

The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC) seeks to accelerate the reduction of short-lived climate pollutants in order to preserve human health, agriculture, and the environment. Since 2013, WHO has been a CCAC partner. The health project is headed by a varied mix of governmental, non-state, and civil society partners who bring a variety of viewpoints and experiences to the table. They are hoping to expand on the momentum of existing sustainability activities through our separate organizations and agencies, concentrating on our shared interest in protecting public health. Traditional practitioners have a critical role in reaching out to at-risk and vulnerable people.

The Intergovernmental Panel on Climate Change (IPCC)

The World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. "To provide the world with a clear scientific view on the present level of knowledge on climate change and its possible environmental and socio-economic impacts," says the IPCC's mission statement. Thousands of professionals from all around the world collaborate to evaluate climate change, its effects, and potential threats by combining the most recent scientific results. Every five to seven years, the process repeats again. The IPCC is made up of 195 people.

TIMELINE OF EVENTS

Date	Description of event
June 5-16, 1972	The First Earth Summit was held in Stockholm. At this summit the UN Environmental Program (UNEP) was formatted.
September 16, 1987	The Montreal Protocol treaty was signed. The main goal of this treaty is to protect the ozone layer by adding ozone-depleting substances.

June 3-14, 1992	The Rio Earth Summit and the signing of the Kyoto Protocol took place.
February 16, 2005	The Kyoto Protocol became a legal requirement.
March 1,2012	EPA's Black Carbon Report was signed
December 12, 2015	The Paris Climate Accord was adopted by 167 Parties. The pact seeks to cut global greenhouse gas emissions significantly.
November 4, 2016	The Paris Climate Accord was entered into force.
October, 2018	Initial IMO GHG Strategy was signed
31 October- 12 November,2021	United Nations Climate Change Conference

RELEVANT UN RESOLUTIONS, TREATIES AND EVENTS

A/RES/74/219[15]

Tittle: Protection of global climate for present and future generations of humankind

This Resolution was adopted on the 19th of December 2019 by the General Assembly. This resolution highlights the importance of previous agreements upon the matter such as the Paris Agreement. Moreover, it seeks collaboration with the IPCC and many more organizations.

A/RES/70/1[16]

Tittle: Transforming our world: the 2030 Agenda for Sustainable Development

This Resolution was adopted on the 25th of September 2015 by the General Assembly. This document mainly presents the reason for which the 2030 Agenda has to be adopted and how positively it will affect our world future. Moreover, it acknowledges the separate difficulties a country could have according to sustainable development. It also elaborated on each goal separately.

[15] *"PDF - A/RES/74/219 - Undocs.org." General Assembly, pdf (undocs.org)*

[16] *"Transforming Our World: the 2030 Agenda for Sustainable Development." A/RES/70/1 - e - A/RES/70/1 -Desktop, pdf (undocs.org)*

The Paris Agreement

The Paris Agreement on Climate Change was formed in 2015 as a result of this support. The agreement's objective is to keep "temperature rise below 2 degrees Celsius over pre-industrial levels, if not below 1.5 degrees Celsius." The goal of this agreement was to improve the ability to deal with the effects of climate change. In 2016, the agreement went into effect. Despite the fact that this agreement has the potential to be extremely useful and productive, several countries have failed to follow through on their promises. For example, India as well as Kenya are two nations that have rejected climate accountability but are still on track to meet their targets of reducing global warming to 1.5 or 2 degrees Celsius.

10-year Climate Action Plan (UN Secretariat)

The United Nations Secretariat has established a new 10-year Climate Action Plan with the goal of reducing greenhouse gas emissions by 45 per cent and getting 80 per cent of power from renewable sources by 2030. The plan is in line with the UN system's environmental protection strategy (2020-2030) and the IPCC guidelines. To achieve these goals, the Plan proposes two key types of interventions. The first entails a limited further shift toward renewable energy self-generation ("intensification track"), with current efforts focusing on reducing consumption through behavioral change, improving energy savings, connecting to existing clean energy grids where available, and connecting to existing renewable grids where available. The second entails transformational change through creative and sophisticated solutions that will necessitate external collaborations, such as scaling up new technologies and procuring renewable energy from third party-owned facilities that have not yet been created ("innovation track"). [17]

Sustainable Development Goals

All UN Member States endorsed the 2030 Agenda for Sustainable Development in 20 15, which provides a shared roadmap "for peace and prosperity for people and the p lanet" today and in the future. The 17 Sustainable Development Goals (SDGs) are at i ts core, and they represent an urgent call to action for all nations -
developed and developing -
to work together in a global partnership. They understand that eradicating poverty a

[17] *Global Environment Facility's Scientific and Technical Advisory Panel, and World Health Organization (WHO). "Black Carbon." Climate & Clean Air Coalition, 1 Jan. 1970, UNITED NATIONS Secretariat Climate Action Plan 2020-2030*

nd other forms of deprivation must be combined with efforts to enhance health and education, decrease inequality, and boost the economy –
all while combating climate change and protecting our seas and forest.

Article 13

The 13th goal is the need for urgent action to combat climate change. For many, the availability of fundamental requirements such as freshwater, clean air, food security, and energy will be impacted by climate change, while attempts to address climate change will likewise inform and define the global development agenda. Global warming and sustainability are inextricably linked. Poor and emerging nations, particularly the least developed, would be disproportionately affected and ill-equipped to deal with the expected shocks on their social, economic, and ecological systems. One of the problems linked with climate change are also greenhouse gas emissions and their implications to the planet as a whole.

Kyoto Protocol

The Kyoto Protocol was enacted on December 11, 1997, with the goal of extending the United Nations Framework Convention on Climate Change (UNFCCC) and therefore lowering greenhouse gas emissions. It was not implemented until February 16, 2005, though. This convention aimed to persuade developed countries to reduce greenhouse gas emissions. It admits that developed countries are mostly at fault for recent increases in greenhouse gas emissions in the environment.

Despite its symbolic value, some today regard the Kyoto Protocol as a failure because it did not result in worldwide carbon reductions. Despite the fact that experts have long warned that even rigorous adherence to the Kyoto Protocol will not stop climate change, this strategy took nearly 15 years to develop. Less Economically Developed Countries are harmed by the Kyoto Protocol's nearly sole focus on mitigation (LEDCs).

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

European Green Deal, adopted in December 2019

The Green Deal is the European Union's (EU) principal new growth plan for transitioning the EU economy to a more sustainable economic model. The EU Green Deal, which was presented in December 2019, has as its main goal for the EU to

become the first climate-neutral continent by 2050, resulting in more affordable energy, a cleaner environment, smarter transportation, new employment, and a higher overall quality of life. The EU Green Deal has a number of financial structures in place, totaling more than €1 trillion. This funding will go toward policy reforms that are necessary for the EU's economic development. Its current aim is that by 2030, 25 percent of EU agriculture will be organic. Moreover, pesticide consumption will have been reduced by half by the same year, the consumption of fertilizers will be reduced by 20% and reduce nutrition loss by 50%.[18]

Group of Seven (G7) Summit (2021)

The G7 is a group made up of the world's seven most developed economies. Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States of America are members of the G7. The G7 Summit was held in the United Kingdom on June 11th, 2021. The G7 leaders, as well as several visitors from India, Australia, South Africa, and South Korea, were all in attendance. Several environmental issues were considered by the leaders. More meetings will be held in the following year, and themes will continue to be explored. The G7 has bolstered worldwide economic and security policies, raised awareness of significant global issues like climate change and gender equality, and sponsored disarmament initiatives. Despite its lack of legal or institutional support, the G7 is viewed as having an enormous worldwide influence.

Clean Air Act

The Clean Air Act is a federal statute in the United States that assists the Environmental Protection Agency in protecting families from various dangerous chemicals that can cause asthma and lung illness. They are most well-known and observed in youngsters. These safeguards will protect the safety of the air, environment, water, and food sources that we breathe, as well as the water we drink. This measure has resulted in the saving of 160,000 lives and the reduction of air pollution. It may be argued that the advantages outnumber the disadvantages.

[18] *"A European Green Deal." European Commission - European Commission, 21 Jan. 2022, A European Green Deal | European Commission (europa.eu)*

POSSIBLE SOLUTIONS

Raise awareness

Informing people about how their actions and the way they live can affect their future and the planet is a sufficient idea. People should be more specifically aware of the negative effects of black carbon and greenhouse gases on the environment and how those affect the globe. In this way, they will be able to be more mindful of everyday activities which add onto the already existing BC in the atmosphere. Seeing that these emissions are due to human causes, ensuring that the general population is informed is crucial. The promotion of sustainability through social media, campaigns, public figures etc. will lead to better treatment of the environment.

Implementation of stricter legislations

With implementing hasher legislations, industries, vehicles, and other black carbon producing sources will be required to limit the amount of greenhouse gases they emit. This will therefore have a positive outcome in the ozone layer. In this way, companies will be able to be regulated in terms of the amount of BC they produce, helping in the mitigation of this pollution.

Control new production

By controlling new production it is implied that new diesel cars and engines will be manufactured in a way that will meet international Particulate Matter exhaust emission regulations.

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