

## FORUM : SCIENCE AND TECHNOLOGY

# ISSUE : THE ROLE OF NEW TECHNOLOGIES IN CLIMATE CHANGE

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### Introduction:

With **Greenhouse gas** emissions increasing every year; the emissions of CO<sub>2</sub> in terakilos increasing about 1.5 times between 1990 and 2000, the threat of **Climate change** has grown considerably. Many developed countries are attempting to cut their carbon emissions while some developing countries are increasing their carbon emissions on a yearly basis and other developing countries that have yet to hit an industrial growth, thus meaning that carbon emissions could rise even more.

As far as **climate change** is concerned, the role of technology has always been contested, technology is either seen to be part of the problem or part of the solution. With both minor and major solutions to the problem of **climate change** being provided constantly. The solution could be split into two groups, reducing **greenhouse gas** emissions or preventing **climate change**.

### Definition of Key Terms:

**Mitigation:** Efforts to reduce or prevent emission of **greenhouse gases**. **Mitigation** can mean using **new technologies** and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behaviour.

**Adaptation:** The adjustments that society or ecosystems make to limit negative effects of **climate change**. It can also include taking advantage of opportunities that a changing climate provides.

**Climate Change:** A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

**Greenhouse Gas (GHG):** A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of **greenhouse gases**.



**New Technology:** Any set of productive techniques which offers a significant improvement (whether measured in terms of increased output or savings in costs) over the established technology for a given process in a specific historical context.

**Geoengineering:** **Geoengineering** or sometimes referred as climate engineering or “planet hacking” is defined by the University of Oxford **geoengineering** program as “large scale intervention in the earth’s natural systems to counteract climate change”

## Background Information:

The concept of using technology as a way in which **climate change** can be halted is fairly recent. Scientific discussions on the nature and causes underlying the **climate change** and natural disasters have intensified recently. The United Nation’s Inter-governmental Panel on **Climate Change** (IPCC) was formed to provide an assessment of global **climate change**. IPCC’s Fourth Assessment Report released in 2007 linked the warming over the past 30 years, approximately 0.7 C to **greenhouse gases**, particularly CO<sub>2</sub>.

To combat the complex issues of the present time, technological solutions are expected to play a key role towards mitigating and adapting to the negative impacts of **climate change**. While solutions for **mitigation** are already being implemented, very few solutions for **adaptation** have been implemented, despite many ideas being conceived. This is most likely due to the fact that it is easier to implement mitigation methods e.g. renewable energy whereas methods of adaptation are far more difficult to implement as they must be specifically designed for each country they are implemented in.

## Major Countries and Organizations Involved:

**All** countries would be involved in this topic as all produce greenhouse gases, but MEDC’s and counties going through the process of industrialisation will have the most involvement as it is them producing the most **Greenhouse gases**.

**United States of America:** The world’s most polluting country per capita and second most per million metric tons.

**China and India:** The first and fourth most polluting countries per million metric tons. Are both developing rapidly and thus greatly increasing their carbon emissions.

**Germany:** A country that is leading the desire to be more reliant on clean energy, it aims to have 80% of its power be from renewable sources by 2050 despite it only relying on it for 25% of its energy. Under the auspices of the Renewable Energy Law,



the government has undertaken an aggressive program to reduce fossil fuels and invest in alternative energy sources, especially solar and wind.

**IPCC:** The Intergovernmental Panel on **Climate Change** (IPCC) is a scientific intergovernmental body under the support of the United Nations, set up at the request of member governments. The aims of the IPCC are to assess scientific information relevant to: Human-induced **climate change**, the impacts of human-induced **climate change**, and options for **adaptation** and **mitigation**.

## Timeline of Events:

**1824** - French physicist Joseph Fourier is first to describe a "greenhouse effect" in a paper delivered to Paris's Académie Royale des Sciences

**November 1988** - IPCC Established

**November 1990** - The IPCC releases the first assessment report saying "emissions resulting from human activities are substantially increasing the atmospheric concentrations of **greenhouse gases**"

**June 1992** - UNFCCC Opens for Signature at Rio Earth Summit

**1995** - IPCC Second Assessment Report concludes that the balance of evidence suggests "a discernible human influence" on the Earth's climate

**December 11, 1997** - Kyoto Protocol Adopted. Developed nations pledge to reduce emissions by an average of 5% by the period 2008-12

**2001** - President George W Bush removes the US from the Kyoto protocol

**2001** - IPCC Third Assessment Report finds "new and stronger evidence" that humanity's emissions of **greenhouse gases** are the main cause of the warming seen in the second half of the 20th Century

**2005** - The Kyoto Protocol becomes international law for those countries still inside it

**2006** - Carbon emissions from fossil fuel burning and industry reach eight billion tonnes per year



**2007** - The IPCC's Fourth Assessment Report concludes it is more than 90% likely that humanity's emissions of **greenhouse gases** are responsible for modern-day **climate change**

**2009** - China overtakes the US as the world's biggest **greenhouse gas** emitter - although the US remains ahead on a per-capita basis

**2012**- The Kyoto Protocol's first commitment period ends

**2013** - The first part of the IPCC's fifth assessment report says scientists are 95% certain that humans are the "dominant cause" of global warming since the 1950s.

## Relevant UN Treaties and Events

One of the major events to happen in the history of **climate change** was the Kyoto Protocol in 2008. The goal of the kyoto protocol was to make countries cut their emissions based on their population size and amount of pollution already being produced in that country. Despite the fact that most of the countries in the protocol failed to meet the goal, this has pushed countries to try and achieve the goals.

The upcoming COP21 in 2015 being held in Paris shows great potential to be the beginning of mass use of green energy becoming a viable solution to the problem of **climate change** as it is one of the major events being discussed at the event.

## Previous Attempts to Solve Issue:

The Kyoto Protocol was an international agreement linked to the United Nations Framework Convention on **Climate Change** (UNFCCC), which committed its Parties by setting internationally binding emission reduction targets. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol placed a heavier burden on developed nations under the principle of "common but differentiated responsibilities.

The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997. Its first commitment period started in 2008 and ended in 2012. 37 industrialized countries committed to reduce GHG emissions, despite the fact that the US senate refused to ratify the treaty, to an average of five percent against 1990 levels. In 2011 Canada became the first signatory to withdraw. Canada's Kyoto target was a 6% total reduction by 2012. However, in spite of some efforts, federal indecision led



to increases in **greenhouse gas** emissions (GHG) since then. Between 1990 and 2008 Canada's GHG emissions increased by around 24.1%.

When 2012 came around the results of the first term were promising, there were more successes than failures and the sum of emissions from nations with Kyoto targets had fallen significantly. In the meantime, however, emissions in the rest of the world had increased sharply. Countries such as China and India take the blame for this, as during their development period their carbon emissions greatly increased.

Several conclusions could be drawn from this failure these could be: Options for reducing CO<sub>2</sub> should be made clearer, Any attempts to reduce CO<sub>2</sub> emissions should be done on a much larger scale.

## Possible Solutions:

A possible yet very controversial solution is that of **geoengineering**, which involves manipulating the earth itself to create a new "climate". It has two methods into which most solutions can be placed, carbon dioxide removal and solar radiation management. Many possibilities involving **geoengineering** have been denied for either political, economic or physical reasons.

When weighing the advantages and disadvantages of **geoengineering**, it is very easy to see why the concept is so controversial. One of the only major advantages to **geoengineering** is the fact that several methods are extremely cheap, yet many of these methods are so far ineffective. Many of the effective options are seen to be massively expensive. Many people are unsure as to whether some of the drastic modifications may have side effects that have until now not been found. One fact is agreed amongst all groups of scientists working in the field of **geoengineering**, the methods used must be cheap, effective and safe before they can be applied in the world.



The concepts of adaptation and mitigation are much safer ways in which countries could cut down on their carbon emissions, however they are not on a large scale. Adaptation is the idea that instead of reducing greenhouse gas emissions, changing the climate, countries use technology to allow them to survive in a more fluctuating climate. A simple example

of **climate change** adaptation would be to create floating crop beds in areas that are prone to flooding, as seen in Bangladesh. This would allow the economy of



Bangladesh to continue growing, without the changing climate causing any form of hindrance.

**Climate change** mitigation is the idea of reducing carbon emissions. An example of this could be as simple as becoming more reliant on renewable energies rather than on fossil fuels, as Germany and Denmark are attempting to do.

## Appendices

[http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php)

<http://unfccc.int/timeline/>

<http://www.adb.org/sites/default/files/publication/149400/technologies-climate-change-adaptation.pdf>

<http://www.ipcc.ch/organization/organization.shtml>

[http://www.aminef.or.id/index.php?option=com\\_content&view=article&id=15:the-role-of-science&catid=9&Itemid=105](http://www.aminef.or.id/index.php?option=com_content&view=article&id=15:the-role-of-science&catid=9&Itemid=105)

<http://www.theguardian.com/commentisfree/2011/sep/02/giant-balloon-and-hose-pipe-geoengineering>

[https://www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/spms4.html](https://www.ipcc.ch/publications_and_data/ar4/syr/en/spms4.html)

