

# Climate Change and Clean Energy



## STATEMENT OF THE PROBLEM

Climate change is a problem of the present. Natural Disasters, such as droughts, floods, and storms, have become more frequent. These disasters both reverse the steps that countries are making towards development and destroy new opportunities for development. Climate change could cause a dramatic reversal of human development during our lifetime and lasting effects for future generations

## CAUSES OF CLIMATE CHANGE

Many scientists agree that climate change is due to the over-abundance of greenhouse gases (GHGs) in the atmosphere. The three most destructive GHGs are carbon dioxide, nitrogen oxide, and methane. **Industrialization**, the increased burning of **fossil fuels**, and controversial practices of obtaining oil have tipped the natural balance in the atmosphere, especially carbon dioxide (CO<sub>2</sub>). As the concentration of CO<sub>2</sub> rises, more heat from the sun is being trapped in the earth's atmosphere causing an increase in global temperatures, a cycle known as the *Greenhouse Effect*.<sup>i</sup>

## CLEAN ENERGY: A TOOL FOR ADDRESSING CLIMATE CHANGE

In order to stop the buildup of **greenhouse gases**, humans must find alternatives to fossil fuels. Clean energy technology is a promising solution for stopping global climate change, but is out of reach for most countries. The largest barrier to the development of clean energy technology is cost. Clean energy technologies, such as solar power, tend to be very expensive, while existing energy sources, such as coal and oil, are cheaper. In addition to cost, many **developing countries** do not have the technical knowledge to start clean energy projects at all. Countries must invest resources in alternative energies to make them affordable for wide use.

## HISTORY OF THE ISSUE

### INDUSTRIALIZATION

The Industrial Revolution, which started in the 18<sup>th</sup> century, brought about clear changes in people's lives. Factory machines replaced many workers and increased production. Roads and railways expanded, and steam power, fueled by coal, made trade and travel easier and faster. These industrial changes also increased the quality and length of people's lives; this led to a population boom. The population increase led to rapid **urbanization** and the growth of cities. Fossil Fuels use

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**Industrialization:** when technology brings new industry to an area

**Fossil Fuels:** Oil, natural gas, and coal energy sources

**Greenhouse Gases:** Gases that absorb radiation from the sun to be trapped on earth

**Developing World:** The part of the world that is just starting to industrialize

**Urbanization:** the process of a settlement becoming more industrialized and taking on the characteristics of a city

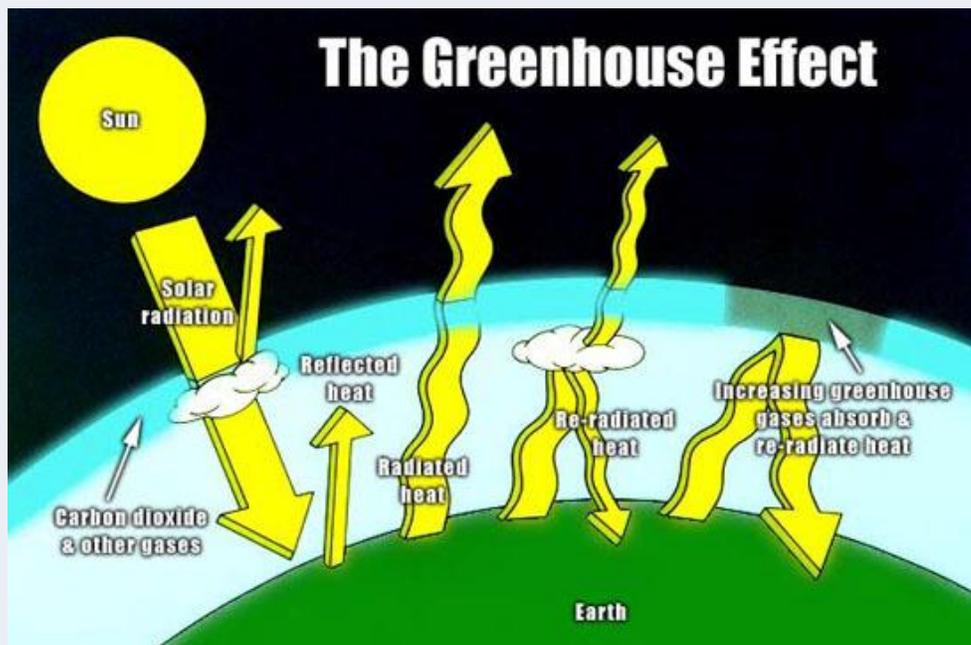
rose dramatically as a result of industrialization and urbanization. These processes first occurred primarily in Western Europe and North America and then spread slowly to the rest of the world.<sup>ii</sup>

But, how did industrialization cause climate change? As more factories were running, as more cars were used, and as more cities were built, the more fossil fuels were used. When fossil fuels are used, they emit green house gases. Greenhouse gases are one of the main reasons that climate change occurs. As the world industrialized, more and more greenhouse gases were being emitted into the atmosphere, which has led to climate change 100 years after industrialization began.<sup>iii</sup>

## SOURCES OF CLIMATE CHANGE

### The Greenhouse Effect

Greenhouse gases, such as carbon dioxide, methane, and nitrogen oxide, are emitted when we use traditional energy sources like oil, coal or natural gas. The greenhouse gases get stuck in our Earth's Atmosphere. When the sunlight enters the atmosphere, it passing through all of the green house gases and warms the Earth. The sunlight wants to move back into space, but the greenhouse gases trap most of the sun's radiation in the Earth's atmosphere. This causes the Earth to gradually warm.



The Green House Effect



The main source of greenhouse gases is traditional energy sources or fossil fuels, such as oil, coal, and natural gas. When fossil fuels are used to drive a car, power a factory, or heat a home, the fossil fuel produces greenhouse gases, which are then released into the Earth's atmosphere. The more fossil fuels are used, the more GHGs are released and get stuck in the atmosphere causing climate change.<sup>iv</sup>

## DISCUSSION OF THE PROBLEM

### EFFECTS OF CLIMATE CHANGE ON THE ENVIRONMENT

#### *Desertification*

Desertification happens slowly when soils **degrade** and plant life disappears in dry environments. Desertification and erosion is caused by human activities such as **over-farming**, **deforestation**, and poorly built irrigation systems. But, desertification also is caused by climate change. Climate change has caused the air temperature to increase and less rain to fall in dry environments. Also, climate change causes more extreme weather, such as dust storms or droughts, to occur. The small amount of rainfall, warmer temperatures, and extreme weather have caused deserts to grow, decreased the amount that is available for farming, and made fresh water scarce. Desertification negatively impacts people by ruining their livelihood (food production), decreasing their water supply, and ultimately, making people move in order to find water and land that can be used for farming.<sup>v</sup>

Desertification, rising temperatures, and resulting droughts were felt in the Horn of Africa, specifically Somalia, in July of 2011 when the worst drought in sixty years left 14 million Africans without water and food production. A **famine** resulted, causing outbreaks of Malaria, Cholera, and Measles viruses that affected millions and required billions of dollars in aid from organizations such as the United Nations High Commissioner for Refugees and the Peace Corps.

#### *Sea Level Rising*

Climate change has caused ocean and sea levels to rise as polar ice caps in Antarctica and the Arctic slowly melt. As the air temperature warms, the ocean water expands, glaciers and ice caps melt, and ice sheets in countries like Greenland melt. Then melted ice flows back into the ocean, and causes the ocean level to rise. According to the U.S Environmental Protection Agency, the ocean levels will rise anywhere from 0.6 and 2 feet by 2100. But, so what if the ocean levels rise? In fact

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**Degrade:** to breakdown slowly and lose nutrients

**Over-farming:** when farmland is farmed so much that there are no more nutrients in the soil

**Deforestation:** destroying forests for human activities such as farming

**Famine:** mass scarcity of food



rising ocean levels causes coastline to **erode**, flooding to occur, and the loss of land. Some small island nations, such as Kiribati, are afraid that if the ocean level keeps rising, ocean water may flood the entire country and submerge Tuvalu underwater. If this were to happen, the country of Kiribati would no longer exist and all of the citizens living in Kiribati would have to relocate. Major cities along ocean coasts such as New York City and Hong Kong would face considerable flooding threats that would affect millions of people. If climate change is not slowed down or stopped, countries could disappear and many people would become homeless and **stateless**.<sup>vi</sup>

### Natural Disasters

Climate change has caused increases in both the number and intensity of natural disasters. Natural disasters such as hurricanes, blizzards, earthquakes, tsunamis, and droughts have a huge and usually destructive effect on development by damaging nations' **infrastructure**. Roads, bridges, railways, and other transportation systems are essential in the path to development and are frequently destroyed by weather disasters. Often agriculture is wiped out and fresh water sources become contaminated. Homes, livelihoods, and communities can be destroyed by just one storm. Most of the world's population lives in coastal cities and towns, which are vulnerable to natural disasters, such as hurricanes, tsunami, and cyclones. Developing countries do not have the money or the resources to protect themselves against environmental disasters or to rebuild what has been destroyed. Slowing down climate change may decrease the number and intensity of natural disasters, but national governments and the international community also must come up with crisis prevention and recovery plans to keep their citizens as safe as possible.<sup>vii</sup>

A major natural disaster occurred in the Tohoku region of Japan on March 11<sup>th</sup>, 2011 when a magnitude 9.0 earthquake, the 5<sup>th</sup> strongest in history, caused a massive tsunami, or tidal wave, to hit northeastern Japan. The tsunami killed over 15,000 Japanese civilians, and negatively affected a nuclear power plant in Fukushima, Japan. The nuclear power plant, capable of melting down and releasing toxic nuclear waste into the atmosphere, began to shut down operations, causing a state of emergency which was considered the second worst nuclear crisis in history, to the disaster at Chernobyl in 1986. The disaster raised questions of how the international community should respond to domestic natural disasters, as well questions the security of nuclear power.

## DIFFERENT TYPES OF ENERGY

### Clean Energy

What is clean energy? Clean energy is an energy source that does not produce any green house gases and is **renewable**. Clean energy is also called alternative energy because clean energy is an alternative to fossil fuels (coal, oil, and natural gas). Clean energy does not pollute the air or

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**Erode:** eat away at

**Stateless:** a person who does not belong to a country or have a nationality

**Infrastructure:** the basic services provided by a state, such as: roads, sewage, water, and schools

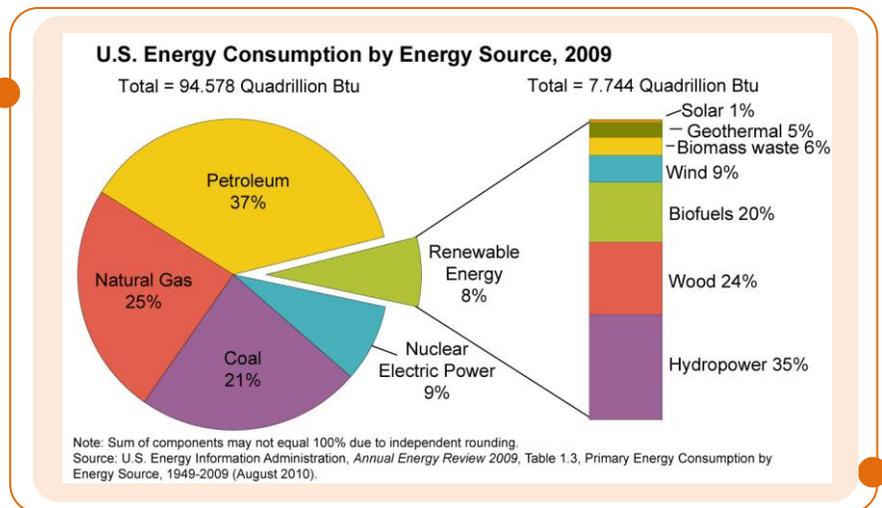
**Renewable:** able to be replaced in a short period of time

the water. There are many types of clean energy, including wind power, biomass energy, solar power, and water or hydropower. All of these clean energy sources provide an excellent energy supply without polluting the water or air. If clean energy sources are so good for the environment and can stop climate change, why is not every country using them as their energy source? Because clean energy sources are expensive to build and use, which is why so many countries have not started clean energy programs.<sup>viii</sup>

### Dirty Energy

What is dirty energy? Dirty Energy is an energy source that produces greenhouse gases and is non-renewable. When dirty

energy sources are used, they pollute the water and air, threatening both human populations and wildlife in effected areas. Fossil Fuels are an example of a dirty energy source. Fossil fuels like coal, natural gas, and oil create green house gases, which causes global warming. If dirty energy sources like oil are so bad for the environment and cause climate change, why do so many countries still use them for their energy source? Because fossil fuels are much cheaper than clean energy sources and countries already know how to use fossil fuels. Nations would need to learn how to use clean energy technology, which takes time and money.<sup>ix</sup>



Even the wealthiest countries in the world cannot afford to use only renewable energy sources. The United States remains largely reliant on natural gas and crude oil, and has been working with TransCanada, and Oil Company, to develop an oil pipeline from sand in Alberta, Canada that contains oil reserves. The development of this pipeline, known as the Keystone XL, has raised considerable debate regarding its negative effects. The pipeline is planned to pass through the Ogallala **Aquifer** in Nebraska, which provides fresh water to more than two million people. The **Environmental Protection Agency (EPA)** fears that the pipeline may contaminate the water source, and wildlife experts fear the negative effects of the pipeline on bird and animal **migratory patterns** through effected areas. The US Natural Resource Defense Council continues to promote clean and renewable energy sources as an alternative to projects such as the Keystone XL pipeline.

**Aquifer:** an underground deposit of drinkable fresh water

**EPA:** The US organization that protects wildlife and natural regions within the nation

**Migratory Patterns:** The seasonal patterns and paths that animals travel throughout the world through the world



## The Problem of Pollution and Development

**Industrialization** is still occurring today. Not all countries today do not have a high level of industrialization because they are still developing. Development in the past happened through the process of industrialization, which we know today is one of the main reasons for climate change. Even though climate change is a problem, millions of people in developed countries have benefited from industrialization. Developing countries want the same opportunity to industrialize as the developed world. If countries do not develop, many people will not enjoy the benefits of technology and a higher **standard of living**. These benefits are not limited to Internet, television or even running water. They also include more job and education opportunities. Is it fair to ask developing countries to stop industrialization because causes climate change? Is it fair that more developed countries continue to be the largest producers of green house gases? Fully industrialized nations such as the United States and Western Europe enjoy high standards of living and robust industry while underdeveloped countries in Africa and the South Pacific struggle with poverty and a lack of industrialization.

## PAST INTERNATIONAL ACTIONS

### INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

The international community's first step in addressing the threat of climate change was to create the Intergovernmental Panel on Climate Change (IPCC) in 1988. The IPCC has since produced four comprehensive reports on the state of the climate and its relationship to development.<sup>xi</sup> The problem with the IPCC is it only issues a report and does not ask or require countries to do anything to help stop climate change.

### THE KYOTO PROTOCOL (1997)

The Kyoto Protocol, part of the United Nations Framework Convention on Climate Change, recognizes that the earth system is a shared resource among all nations. It pressures developed nations to reduce their emissions, since they emit the largest percentage of green house gases. Any nation who signs the Kyoto Protocol has legally binding targets for emissions reduction between 2008 and 2012, and the Kyoto Protocol was signed by 190 nations.<sup>xii</sup> The main problem with the

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**Industrialization:** A process through which society changes from being based on agriculture (farming) to being based on industry (factories and business)

**Standard of Living:** Access to necessities for live (food, water, shelter) as well as personal luxuries



Kyoto Protocol is that it requires rich countries to cut their green house gas emissions, but does not make quickly industrializing countries, such as India and China, cut their green house gas emission and India and China are some of the worst offenders in green house gas emissions.<sup>xiii</sup>

## THE 2011 UN CLIMATE CHANGE CONFERENCE (2011)

United Nations member states met in Durban, South Africa this past year to discuss the negative effects of climate change and international goals that can be set to curb carbon emissions. A legally binding document set to begin in 2015, requiring nations to reduce their carbon emissions and increase their usage of renewable energy sources was agreed upon and signed. The agreement included important nations such as the United States, China, and India, who were not signatories to the Kyoto Protocol. Next year the UN Conference on Sustainable Development will occur in Rio de Janeiro, Brazil.

### QUESTIONS TO CONSIDER:

1. Is my country suffering from natural disasters? Desertification? Rising Sea levels?
2. Does my country produce and export oil?
3. Does my country import and use a lot of fossil fuels, such as oil?
4. Is my country a leader in clean energy technology?
5. Is my country industrialized?

## BLOC POSITIONS

### NORTH AMERICA

Overall, North American countries are the largest producers of CO<sub>2</sub> and the largest **consumers** of fossil fuels. They are making an effort to develop and refine clean energy technologies. However, implementation of clean energy has been slow and many feel that the time and effort that North America is putting into sustainable development is inadequate, and as some of the richest countries in the world, they need to be doing more.

### SOUTH AMERICA

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**Consumer:** the person or country that buys and uses a product



The countries of South America vary drastically in how much they implement clean energy technology. Brazil has taken the lead in **flex-fuel cars** and is **self-sufficient** in **ethanol** production. Most other countries in South America do not have the money or resources to produce or implement these technologies and are struggling to maintain any sort of development.

## EUROPE

The European states have made an effort to become more “green” or use more clean energy technologies. Many countries are making an effort to reduce green house **gas emissions**<sup>23</sup> whenever possible.

## AFRICA

Most of the African nations are still developing and do not have the money or the technology to implement clean energy technology. Many of the countries feel that it is unfair for the developing world to try to impose emissions caps on them when they are still so far behind in development and industrialization.

## ASIA

The countries of Asia have very different views on sustainable development and very levels of green house gas emissions. Some countries feel that it is necessary and have already taken steps towards reducing their emission, such as Japan. However, some countries also feel that caps on emissions will hinder their progress and development on the world stage, such as the China.

## OCEANIA

Most countries of Oceania are islands, and are therefore highly concerned with the rising sea levels that come with climate change. Many of them have made great efforts to reduce emissions while also considering relocating their populations to less vulnerable areas. Many countries in this region have set goals to become carbon neutral in the next 50 years.

## MIDDLE EAST

The Middle East countries collectively hold the most oil in the world. Most of their economies are based on the drilling, production, and exportation of oil and fuel. Most Middle Eastern Countries want to make sure that oil remains the primary source of energy for all countries.

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**Flex-fuel cars:** cars that run on gas and ethanol

**Self-sufficient:** when a country produces enough of a product for everyone in the country

**Ethanol:** alcohol

**Emissions Cap:** The highest of emissions countries are allowed to have

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