ASSESSMENT OF THE CAP AND TRADE APPROACH TO MITIGATE CARBON DIOXIDE EMISSIONS

Advanced Project

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Abstract

Several governments, non-government organizations (NGOs), and some oil corporations are taking measures to globally regulate greenhouse gas emissions such as carbon dioxide (CO₂) to preserve the environment. One of the methods being discussed to address climate change is cap and trade. Some oil corporations and most governments view this program as a cost effective strategy for balancing the increasing demand of fuel production with the need to reduce the high levels of CO₂ emissions. Opponents of this market-based mechanism argue that it is not environmentally sustainable, it only benefits corporations, and costs get passed on to consumers. Supporters argue that cap and trade can reduce emission and contributes to environmental sustainability. To better understand both arguments, this paper explores the advantages and disadvantages of the cap and trade program and determines if the design will deliver financial results and reduce carbon dioxide emissions in the environment.
Introduction

My goal for this advanced project is to examine the issues of carbon emissions and their long term effects on the global environment. This paper will discuss, evaluate, and assess the cap and trade approach to mitigating carbon dioxide in the global atmosphere. Increased carbon emission is causing long term environmental damage; if measures are not taken the destruction from climate change may be irreversible. Today, there are global efforts from some oil and gas companies and governments collaborating to reduce emissions through the expansion of the cap and trade program. However, to reduce emissions there must be a unified approach from both the public and private sectors because if the warming trend does not change, extreme weather disasters will continue to occur, and human lives and wildlife will continue to be destroyed.

Many people have concluded that climate change is a growing problem. The United States Environmental Protection Agency (EPA) (2015, US) reports that the primary reason the climate is changing is due to the high level of carbon dioxide (CO₂) emissions in the atmosphere caused by human activities. According to the Organization for Economic Cooperation and Development (2013) carbon dioxide (CO₂) is a colorless, odorless, and non-poisonous gas formed by combustion of carbon. It is considered a greenhouse gas which continues to make Earth’s temperatures rise. The EPA (2015) stated that the release of emissions from oil production is increasing the levels of CO₂ into the atmosphere having a negative effect on the earth’s ecosystem. The EPA further explains that while greenhouse gasses are naturally present in the earth’s atmosphere, human activities such as fuel production is the greatest increase of CO₂ emissions, causing extreme weather events.

According to the EPA, the main source of increased emissions in the atmosphere is the combustion of fossil fuel. Byrne et al. (2007) indicates that the use of energy resulting from
burning coal, gas, and oil emits the highest CO$_2$ emissions, increasing the earth’s temperature. Most scientists believe that the high level of heat is increasing the frequency and intensity of extreme weather events leading to natural disasters. The Intergovernmental Panel on Climate Change (IPCC, 2013), disclosed that the additional heat in the seas and atmosphere has been a factor in “extreme events” such as tsunamis, earthquakes, and droughts. In order to reduce emissions and minimize catastrophic events there must be precautionary measures. Cap and trade can be a proactive approach to reducing carbon dioxide emissions from fossil fuel consumption.

The cap and trade strategy is being discussed globally amongst governments, non-government organizations (NGOs), and some oil and gas corporations around the world as a precautionary measure to address climate change. Several NGOs, most governments, and some corporations argue in favor of globally regulating greenhouse gasses to reduce carbon dioxide emission. The EPA says that cap and trade programs are environmental policies designed to improve air quality and provide economic opportunities for sustainable energy sources. To explain, the mandated cap helps reduce emissions and the trading method provides corporations the flexibility in how to comply. In order to develop a legally binding global agreement among all nations, the United Nations Framework Convention on Climate Change (UNFCCC) will meet in Paris in December 2015 to address emissions, rising global temperatures, and the potential implementation of a cap and trade mechanism to report these problems. To better understand these concerns, this paper explores the advantages and disadvantages of the cap and trade program and determines if the initiative is an effective design that balances the need for economic growth and environmental sustainability.
Significance

This topic of the cap and trade approach to mitigating carbon dioxide is important to me because I am the EPA Fuels Compliance Specialist employed at BP in Chicago, IL. BP is one of the world's leading international oil and gas companies involved in oil and gas extraction, production, refining, distribution, and transport. My responsibilities in the organization are to track emissions and adhere to the EPA fuels regulations. Many of these regulations are centered on tracking various chemicals contained in hydrocarbon products such as volatile organic compounds, sulfur, and benzene. This advanced project is important because it allows me to better understand how emissions trading (cap and trade) can potentially resolve global environmental issues while expanding global economies. This program applies to both my current and future position at BP.
Definition of Terms

Cap and trade

“Program enacted to promote environment-friendly policies by mandating emissions. The emissions allowance is strictly controlled and must not exceed the predetermined cap amount. Emissions permits are provided to businesses, and are capped by government. Businesses are able to transfer these permits to other capped businesses if the business determines that it will not need all the permits provided” (Business Dictionary, 2015).

Carbon dioxide

“Carbon dioxide (CO₂) is a colorless, odorless and non-poisonous gas formed by combustion of carbon and in the respiration of living organisms and is considered a greenhouse gas” (OECD, 2013).

Carbon footprint

“The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide” (RGGI).

Climate change

“Changes in average weather conditions that persist over multiple decades or longer” is as defined by Intergovernmental Panel on Climate Change (IPCC).

Emissions

“Emissions are the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time” (OECD, 2013).

Extreme events

Intergovernmental Panel on Climate Change defines extreme events as “a weather event that is rare at a particular place and time of year” (IPCC, 2014).
**Regional greenhouse gas initiative**

The Regional Greenhouse Gas Initiative (RGGI) is the first market-based regulatory program of the north-east and the mid-Atlantic of the United States designed to reduce greenhouse gas emissions as proposed a regional cap and trade program for CO₂ for power plants (Jeev & Campos-Nanez, 2010).
Literature Review

Historical Analysis

In order to comprehend the complexity of climate change, one must examine the history and intent of climate change policy and practice. US Legal, Inc. (2014) explained that prior to the Great Depression, governments and oil corporations did not take on an active leadership role in the energy industry. It was during the Great Depression and World War II that the regulatory structure began. However, this research will begin post 1970s because the energy crisis during that decade was so instrumental in influencing future policies and government involvement.

Arms (2012) acknowledged that historically corporations have not focused on the environment without pressure from the government or the public. Arms (2012) believed that the 1970s was an era in which the public and environmentalists were becoming cognizant of the damage that oil production was causing on the environment. During that era, Arms added that Americans were more concerned about environmental problems and began to complain about air pollution, leading politicians to place an emphasis on policymaking and sustainable energy. As a result, on December 2, 1970, the EPA was created. The EPA is a United States federal government agency which focuses on conservation and sustainability of the ecosystem and protecting human health by establishing and enforcing regulations based on laws passed by Congress. Shortly after the EPA was created, “there were many federal agencies and policies formed in the United States such as the Clean Air Act in 1970 to manage the environment and made major revisions in 1977 and 1990” (p. 1).

At the international level, the United Nations Environment Programme (UNEP) was founded in 1972 (UNEP). UNEP is a United Nations Programme that assists developing countries in implementing environmental procedures and practices. UNEP coordinates
environmental activities concerning the atmosphere, ocean life, and environment. UNEP also educates, assesses, and restores the ecosystems in developing countries. In addition, UNEP established Intergovernmental Panel on Climate Change (IPCC, 2007) to assess “the socio-economic aspects of climate change and its implications for sustainable development” (IPCC, 2007).

**Global Temperature Rise**

Throughout the past decades the global temperature has risen significantly. The Intergovernmental Panel on Climate Change (IPCC, 2013) 4th Assessment Report informed the public that during the 1980s, scientists warned that the global temperature rise was due to human activity such as increasing emissions to greenhouse gases (GHG) through oil production. The IPCC (2007) further stated that human impact on climate is “to exceed 90% probability standard” (IPCC, 2007), and if there is no effort to reduce the heat, the high level of CO₂ emissions in the earth’s atmosphere will continue to increase the occurrences and severity of extreme weather events such as storms. In an effort to reduce emissions, UNFCCC was then created in 1992 to stabilize the greenhouse gas emission in the atmosphere at levels that would prevent anthropogenic interference. Under the UNFCCC, Fleming and Webber (2004) explained that in 1997, the Kyoto Protocol, an international treaty, was set for reducing GHG emissions for developed countries. The primary document, the Kyoto Protocol, set legally binding targets for developed countries to reduce their GHG emissions between 8% and 12.5% below 1990 levels over the five year period 2008-2012 but this international agreement lacked the mechanism to enforce its recommendations globally because the United Nations does not have the authority to enforce the laws. The EPA (2015) claimed that rise of the earth’s temperature will continue unless billions of tons of annual emissions decrease. These changes will impact the food and
water supply, infrastructure, and human health. Victor and House (2006) noted that in May of 1997, BP CEO John Browne announced publicly that climate change is becoming a threat as seen in an increase as major weather events such as droughts, earthquakes, tsunami, and tornadoes. Victor and House (2006) further documented that BP is the first major international oil company to recognize publicly the threat of global climate change. Today, some oil corporations are taking the lead in regulating themselves to further contribute to environmental sustainability.

**Oil Industries’ Response**

In spite of the lack of previous success, the UNFCCC is continuing their efforts to promote and deliver a new and universal greenhouse gas reduction protocol. The UNFCCC is attempting to develop a global agreement in order to reduce emissions and minimize rising global temperatures. The International Institute for Sustainable Development (IISD) Reporting Services (2015) reports six major oil and gas companies are asking government to legislate cap and trade. The following international corporations are BG Group plc, BP plc, Eni S.p.A., Royal Dutch Shell plc, Statoil ASA and Total SA. These corporations wrote to governments around the world and to the United Nations Framework Convention on Climate Change (UNFCCC) that there must be clear, and stable policy frameworks that connect national systems; in addition to carbon pricing methods. Oil corporations such as ENI S.P.A stated that global environmental sustainability is important; therefore, the cap and trade approach would help reduce and encourage the most cost effective ways of reducing carbon emissions.

Oil corporations are asking governments around the world and the UNFCCC to create a global international framework to stabilize greenhouse gases in the atmosphere. Part of the
climate action plan is to legislate carbon pricing. This proactive measure is vital because there must be a unified global effort to reducing carbon emissions.

In the United Kingdom, for example, BP plc’s role in the cap and trade program proved to be a credible concept because it was able to gradually reduce carbon emissions. According to Victory and House (2005) BP’s participation in the cap and trade program reduced carbon emissions to more than ten percent below 1990 levels. The authors further stated that by the end of 2001, carbon emissions dropped approximately 15% from 1998 levels. As a result of the success of BP’s cap and trade program, most governments and some corporations recognize the importance of addressing CO$_2$ emissions and believe that the cap and trade program is a solution to lower climate risks. On the other hand, Steve Richey (2010) stated that some economists believe that cap and trade is not environmentally sustainable and it will hamper the economy and corporations profits.

When it comes to the topic of increased CO$_2$ emissions in the atmosphere, most people agree that there should be efforts made on reducing greenhouse gas. Where this agreement usually ends is on the question of the cap and trade strategy and who is going to benefit, the economy or environment. According to Steve Richey (2010) agrees that cap and trade benefits the economy, however, legislation is needed to monitor, control, and reduce greenhouse gasses. Steve Richey (2010) indicated that the cap and trade program allows flexibility and can be the lowest- cost method for reducing pollution in the following ways:

- allows companies to reduce their emissions at a low cost, and sell the emissions credits to companies who cannot stay within their own emission limits
- may increase governmental revenue
- provides an alternative to traditional regulation
• contributes to environmental sustainability with a set specific emission limit
• increases the effectiveness of global compliance through global regulations
• permits for compliance flexibility through the trading allowance
• lower permitting and transaction costs for corporations
• compatible with other nations existing mechanisms

To be truly beneficial, there needs to be legislation on cap and trade because it is the most economical approach to steadily reducing emissions from the combustion of fossil fuel.

**Impact on Economy**

While carbon pricing seems like it would be a problem for some corporations, their ability to trade in the market allows for profit growth. Du et al. (2015) explained that cap and trade is an instrument to help reduce CO₂ emissions. The authors further stated that this market-based theory can also provide economic incentives to participants in the program, and increase corporations’ profit margins on the supply and demand strategy. In other words, corporations have a positive response in the market.

The cap and trade regulation is viewed by governments as an effective way to reduce the carbon emission. The EPA (2009) analyzed that under a cap and trade system, a cap on emissions is set by governments on the total amount of CO₂ emissions that are permitted to be emitted by the registered participant. The EPA (2009) further showed that allowance to emit CO₂ emissions are then allocated to the emissions trade market. By limiting the right to emit CO₂ emissions, a market is created where allowances can be bought and sold by registered entities in order to meet their compliance requirements. An entity can choose to meet its obligations by reducing its emissions or purchasing allowances from the market via trading to offset emissions. The EPA (2009) acknowledged that corporations who are efficient have the option to sell their
excess at a price. The US federal government further stated that substantial gains can be made if these commodities are strategically bought and sold, but the cap and trade program can be sustainable as more corporations become efficient to meet their emissions limit.

On the other hand, Steve Richey (2010) contended that the cap and trade strategy may encourage the coal, oil and gas industries to disregard alternative energy because the purchase of carbon credits may be less costly than switching to renewable fuels or making capital investments of equipment for better production efficiency. The emission trading program requires corporations to become more efficient and green which may impact their profit margins. Scientists and economists Beach et al. (2009) emphasized that putting a price on carbon emissions would have an insignificant impact on greenhouse gas emissions, but the increase in government regulation may result in tax increases to consumers and corporations. The authors further argued that unemployment may increase as a result of increased costs, and create an upsurge in the cost of electricity for consumers. On the other hand, Ellerman and Harrison (2013) claimed that giving corporations the flexibility to trade emissions can reduce compliance costs to achieve emissions target. Ultimately, the cap and trade program ensures that corporations achieved their environmental targets in an efficient and less costly manner as opposed to retrofitting their refinery such as equipment and systems improvements which can be extremely costly for companies.

The EPA (2015) announced on June 25, 2013, that President Obama will “reduce carbon pollution, prepare the United States for the impacts of climate change and lead international efforts to address global climate change.” However, The Wall Street Journal posed the question “Who Pays for Cap and Trade?” claiming that:
Politicians love cap and trade because they can claim to be taxing "polluters," not workers. Hardly. Once the government creates a scarce new commodity -- in this case the right to emit carbon -- and then mandates that businesses buy it, the costs would inevitably be passed on to all consumers in the form of higher prices. (p. 1)

Despite this short term economic impact, the EIA (1998) analyzed that the effect is temporary because “when energy production is restricted, economic performance falls for some period of time;” however, it then re-stabilizes (EIA, 1998). Some politicians and major oil and gas companies believe that with stricter controls and governmental oversight, cap and trade can prove to be a safe alternative to reducing emissions while playing an important role in growing the economy.

The EPA’s cap and trade programs in the United States to date have been mainly focused on power generation because power plants are a significant source of pollutants that can impair human health and the environment. The Regional Greenhouse Gas Initiative (RGGI), a cap and trade regulatory program of the north-east and mid-Atlantic of the United States designed to reduce greenhouse gas emissions, found that this cap and trade program provides results both environmentally and economically. A case in point, in 2013 Tandon (2012) wrote that carbon from power generation was down by about 51% in 2005 levels due to utilities using less coal for electricity. Tandon further confirmed that in 2011 carbon emissions fell 2.4% from 2010. The Energy Information Administration stated that the 2.4% was due to a warmer winter.

In discussion of environmental policy framework, Ruth et al. (2008) mentioned that environmental policies such as the Healthy Air Act (HAA) (Maryland General Assembly, 2006), mandated reductions in coal-fired power plant such as nitrogen oxides (NOx), sulfur dioxide (SO2), and mercury in order to address CO2 emissions from power plants by requiring Maryland
to fully participate in RGGI. In the case study of Maryland, Ruth et al. (2008) indicate that the emissions trading system in RGGI resulted in reductions of CO₂ from electricity. Furthermore, the RGGI (2015) report showed that the initiative has an investment of over $1 billion in energy of the New England and Mid-Atlantic states. For example, Maryland is:

expected to return more than $2.3 billion in lifetime energy bill savings to 1.2 million participating households and 17,550 businesses in the region. Maryland will save 1,181,406 kWh of electricity and 30,914 Therms of heating fuel per year. This energy savings equates to a reduction of 1,089 short tons of CO₂ or CO₂ equivalent emissions annually. (RGGI, 2015, p. 3 & p. 21)

RGGI is the nation’s first mandatory greenhouse gas pollution reduction program for power sector CO₂ emissions in the Mid-Atlantic region to support the reduction of global climate change and improving energy efficiency. According to the RGGI the program saves consumers money on energy bills and helps support corporations. At the same time, the national efforts made can be easily aligned with the international efforts and the United Nations framework on climate change.

Stavins (2007) indicates that there is a need for US policy that addresses climate change. The cap and trade is the best method because it is easier to “harmonize” with other countries’ climate policies and has a successful history adoption in Mid-Atlantic region. The ability for carbon credits to be traded allows for companies to reduce emissions in the most cost effective means. The reduction in the number of these credits will help the United States meet reductions in greenhouse gas emissions as recommended by the United Nations Framework Convention on Climate Change, recommending a reduction in emissions of 80% by 2050 (UNFCCC). The
global efforts being made on greenhouse gas reduction is the right path and best integrated method to environmental sustainability.

**Environmental Impact**

Oskin (2015) pointed out that on March 11, 2011 Japan experienced a magnitude-9.1 earthquake unleashing a violent tsunami killing 15,891 and 2,500 people is still missing. Oskin further reports that 230,000 residents in Japan are still recovering from the aftermath. The tsunami crossed the Pacific Ocean; the Fukushima plant and buildings destroyed by the tsunami released thousands of tons of chemicals and greenhouse gases into the air (Oskin, 2015). The chemicals released from Fukushima have been detected along the coast of North America, Canada, and California. Oskin also mentions that five-foot wave killed more than 110,000 nesting seabirds at the Midway Atoll National Wildlife Refuge. According to the Japanese government, total damages from the earthquake and tsunami are estimated at $300 billion dollars (Oskin, 2015).

The four year drought in California has made the environment prone to wildfires. Najarian et al. (2015) added that 9,000 firefighters fought 24 large fires in California on Saturday, August 1. According to O’Connor (2015), California's drought will cost the state $2.7 billion dollars in the agriculture industry.

**Literature Review Summary**

Long-term environmental consequences, caused by ozone depletion, are more costly and devastating than strategic capital investments. The reduction of emissions and the expected corresponding decrease in extreme weather events are critical to the ecosystem. The high costs of recovery from catastrophic events will be unsustainable as their frequency and intensity increases. To protect the future, there must be a unified global effort from governments,
corporations, and consumers because if global warming trend does not change, extreme weather disasters will continue to occur and devastating the ecosystem.

**Methods**

Several existing peer reviewed literature were used to analyze the cap and trade program. A computer based information search was conducted on the DePaul library computer databases, Google Scholar, and the federal governments and the United Nations websites. The search covered many abstracts and articles from 2004 to 2015. The key terms searched in the databases were the following: cap and trade, raising awareness of climate change, extreme events, carbon dioxide emissions, carbon pricing, Kyoto Protocol, Regional Greenhouse Gas Initiative, greenhouse gasses, climate change, carbon pricing economic impact, United Nations, governments cap and trade regulations, global warming, United Nations Conference in Paris, history on environmental policies, Intergovernmental Panel on Climate Change, Obama on climate change 2015, and pros and cons of air emissions credit trading. The individual key terms typically listed approximately ten or more articles. When searching the Internet for documents, I used the first three sites to report and address my research on cap and trade because they were the most appropriate.

**Framework and Artifact**

While working on my research and interviewing people, I was surprised at the lack of general public awareness on the subject of cap and trade. As a result, my approach would be to create a blog and quarterly newsletters published in the Wall Street Journal to inform the public of the cap and trade strategy. The blog and quarterly newsletters will educate the public on how the cap and trade program works and share the advantages and disadvantages of the program. The survey will ask readers the following questions:
1) Should cap and trade be adopted?

2) Is cap and trade good for oil companies?

3) Is cap and trade good for consumers?

4) Is cap and trade good for the environment?

5) All the above.

The blog will provide an opportunity for supporting or opposing opinions of the cap and trade initiative (See Appendix 1 - Newsletter).

**Conclusion and Recommendations**

The cap on emissions may help preserve the environment; the allocation or trading method provides the economic incentive. To explain, the cap and trade program may provide oil corporations the flexibility to implement cost effective technologies and practices that improve operational efficiency while reducing greenhouse gas emissions. Unified government intervention through legislation is needed to achieve an effective change.

Cap and trade may be a key tool in reducing greenhouse gas emissions to improve air quality. The high cost and relative low efficiency of alternative energy has not provided significant reductions. While there have been some successes with the cap and trade system in the past such as the federal acid rain program for sulfur dioxide, RGGI program, and the Kyoto Protocol, the global use of legislation is needed because it is evident that human activities are having a measurable impact causing extreme weather events.

The economic expense to rebuild infrastructures will be devastating to all facets of society. Governments will need to play a strong leading role in implementing meaningful and impactful regulations to reduce emissions. The policies and procedures set forth need to be sustainable on a global level to prove most effective. Although carbon pricing may impact
corporate bottom lines due to taxes, equipment and systems improvements, trying to find a balance between maximizing profits and corporate social responsibility should take precedence. The long term environmental benefits would outweigh any short term economic problems. While costs may increase for consumers at the start of the program, that cost increase pales in comparison to the potential catastrophic effects on the ecosystem and human life.

To protect the future, governments, businesses, and consumers are accountable for environmental sustainability. It is the responsibility of all governments and corporations to analyze, monitor, and reduce carbon emissions, and for each individual person to reduce their own personal carbon footprint to ensure fresh water and clean air for future generations.
References


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