

The Role of Developing Countries in the Continuation of the Kyoto Protocol

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1.0 ABSTRACT

Bilateral and multilateral environmental agreements are implemented to enforce provisions for the management of environmental concerns that are perceived to cross state borders. In 1994, the United Nations Framework Conventional on Climate Change (UNFCCC) entered into force to provide a framework within which the international effort to manage climate change risks could be developed, with the Kyoto Protocol to the UNFCCC being added in 2005 in an attempt to apply commitments with respect to emission reductions. Criticism of the Kyoto Protocol identifies concerns with a lack of effectiveness in reaching the necessary targets for the mitigation of climate change, with an impotent enforcement mechanism and with selective application only to developed countries. This paper provides a summary of views on the environmental agreements currently in place and reviews policy proposals to identify the facets of a potentially effective global environmental agreement. The role of developing countries is examined in detail to understand how developing countries could be integrated into a proposed global environmental policy structure. A policy structure is briefly outlined that provides for the gradual convergence of global per capita emissions through a phased approach to emissions reductions. The conclusions indicate that a strong regulatory body and firm emissions targets specific to each country are necessary for the mitigation of climate change and provisions for these should be included in a future revision of the Kyoto Protocol.

2.0 INTRODUCTION

Environmental policy is a broad reaching term that describes policies implemented on various governmental levels that pertain to the use of regulatory tools that have the potential to effect the environment. Environmental policies are created at different orders of government, such as the

municipal ban on cosmetic pesticides in Toronto¹ (followed shortly after by a provincial ban for all of Ontario²), and the Canadian initiatives for the reduction of Volatile Organic Compounds from consumer and commercial products³. In addition to internal policies developed by a country, bilateral and multilateral agreements are also implemented to enforce provisions for the management of environmental concerns that are perceived to cross state borders. The Vienna Convention for the Protection of the Ozone Layer (United Nations, 1988), which entered into force in 1988, and was revised to include the Montreal Protocol on Substances That Deplete the Ozone Layer in 1989 (United Nations, 1989), was an early multilateral environmental agreement (MEA) that is currently ratified by all of the UN member nations. Specifically, the Montreal Protocol has been considered as a successful example of an MEA because the widespread agreements with the included restrictions resulting in effective implementation.

Boyd (2001) states that “[i]t is widely acknowledged that emissions of greenhouse gases by human society are causing climate change on a global scale. Most anthropogenic greenhouse gas (GHG) emissions are caused by the burning of fossil fuels for energy and by industrial processes such as petroleum refining and cement manufacturing. The dominant greenhouse gas is carbon dioxide.” Consequently, the focus of the development of MEAs has shifted to the implementation of policy mechanisms that result in the widespread reduction of greenhouse gas (GHG) emissions. In 1994, the United Nations Framework Conventional on Climate Change (UNFCCC) entered into force to provide a framework within which the international effort to manage climate change risks could be developed. The Kyoto Protocol to the UNFCCC

¹ http://www.elgar.ca/toronto_pesticide_bylaw.htm

² <http://www.ene.gov.on.ca/en/land/pesticides/index.php>

³ <http://www.ec.gc.ca/cov-voc/default.asp?lang=En&n=424DFC9B-1>

(UNFCCC, 2005) entered into force in 2005, and represented an effort to apply commitments with respect to emission reductions. Appendix A provides graphs showing the total and per capita emissions of GHGs for all of the countries in the world that provided emissions values to the United Nations Statistics Division (UN, 2009). The graphs are separated by continent as defined by the seven-continent model, which include North America, South America, Asia, Europe, Africa and Oceania and the Antarctica (not included in the graphs).

3.0 THE KYOTO PROTOCOL

The Kyoto Protocol could be considered one of the more well-recognized MEAs developed, possibly because of the substantial economic, environmental and political impacts of the included targets for reductions in GHG emissions, and the publicity associated with the decisions on who would and would not be included in the agreement. In fact, a study of Canadians undertaken in 2002 identified that 50% of all those interviewed were familiar with the Kyoto Protocol, and a quarter of interviewees were closely following the related issues (EKOS, 2002). Though at this time, almost all countries have ratified the Kyoto Protocol, the focus of reduction targets has been the developed countries (the 37 Annex I countries).

The UNFCCC calls for a separate commitment item (item 2) that applies only to Annex I countries and dictates that “[e]ach of these Parties shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs.” (U.N., 1992) The Kyoto Protocol is intended to provide more structured guidelines on the implementation of this commitment for the Annex I countries. However, it is notable that the United States elected not to ratify the Kyoto Protocol, despite their role as a large scale

emitter. It is hypothesized that this decision not to ratify was the result of the economic downturn and energy shortage that the U.S was facing, and concerns over the practicality of meeting the emission reduction targets (Reynolds, 2001). This is discussed further in Chapter 5. The Kyoto Protocol was a challenging agreement to negotiate and ratification by the participating countries was hard won. Three factors strongly influenced the domestic decision to ratify the Kyoto Protocol and these included 1) normative pressures from NGOs and foreign governments (the “peer pressure” effect); 2) international negotiations to reduce the costs of compliance and entice late ratifiers (such as Russia, whose ratification of the Kyoto Protocol coincided with their admittance into the World Trade Organization); and 3) concerns over competitiveness and the interdependent global economy, where encouraging others to join would equalize the burden (Harrison and Sundstrom, 2007).

The Kyoto Protocol has a stronger compliance system than past MEAs, which includes some consideration of due process (Ulfstein and Werksman, 2005). Compliance mechanisms were instituted under the Kyoto Protocol through the development of a compliance committee under the UNFCCC (UNFCCC, 2010). The compliance committee was made up of two branches – the facilitative branch and the enforcement branch. The enforcement branch has the responsibility of determining the consequences for parties that are not meeting their commitments, and determining whether a country is not in compliance with their emission targets, methodology or reporting requirements or eligibility requirements (UNFCCC, 2010).

An exceedance by a ratifying country requires the enforcement branch to declare the non-compliance and the party must make up the difference between actual emissions and the assigned

amount during the second commitment period of the Protocol. Additionally, the party will also be subject to a deduction of 30% in emissions allowances during the second commitment period. The party is required to submit a compliance action plan and their eligibility to make transfers under emissions trading is suspended temporarily until the compliance committee indicates that they are reinstated (UNFCCC, 2010). Despite these efforts, the Kyoto Protocol has been the subject of criticism by those who believe that in an international context, sovereigns remain strong and enforcement is weak (Ulfstein and Werksman, 2005). No mechanisms for enforcement exist beyond sanctions related to inclusion in the Kyoto Protocol reporting and trade system. If a country were to find a way to leave the ratifying group, there would be no additional consequences to enforce.

The consequences for countries that do not meet their Kyoto Protocol emission targets expand beyond those administered by the Kyoto Protocol compliance mechanisms. On an international level, they are breaking an international treaty, and could be penalized by the recourses of the treaty itself, or through trade consequences with other countries (Saxe, 2008). This could result in reputational concerns (i.e. the criticism that Canada has incurred by not meeting or striving for their Kyoto Protocol emission targets), particularly with countries who have worked hard to meet their own targets, at a great potential economic expense. On a domestic level, countries that have ratified the Kyoto Protocol will also have developed associated federal policies in order to meet their emission limits (Saxe, 2008). Therefore, if a country fails to meet these limits, there is the potential for domestic consequences, both political and legal. An example of this is occurring in Canada, as Friends of the Earth have engaged the federal government in two lawsuits citing Canada's violation of the agreement entered into by ratifying the Kyoto Protocol (Saxe, 2008).

Though the result of the lawsuit can only be enforcement by Canada to follow its own law, the lawsuit may result in negative publicity and political consequences.

According to Hare (1999), who quoted Professor Bert Bolin, the Chairman Emeritus of the Intergovernmental Panel on Climate Change, the provisions in the Kyoto Protocol will only slow the projected rise in global temperatures by 0.1 to 0.2 degrees Celsius by 2050. The current target taken on by the G8 (consisting of Canada, France, Germany, Italy, Japan, Russia, United Kingdom and United States) is to restrict global temperature rise to below 2°C above the global temperature in pre-industrial times, as indicated in the Copenhagen Accord initiated in December 2009. According to a report in March, 2010 (Reuters, 2010), some developing countries are expressing concern that this is not sufficient, and that the goal should be to restrict global temperature rise to below 1.5°C above the global temperature in pre-industrial times. If Bolin is correct in his assessment of the effectiveness of the Kyoto Protocol provisions, it is clear that the Protocol will need to be revised in order to meet the 2°C targets set forth by the ratifying countries. According to Olmstead and Stavins (2006), “[b]ecause the Kyoto Protocol’s ambitious targets apply only to the short term (2008 to 2012) and only to industrializes nations, the agreement will impose relatively high costs and generate only modest short-term benefits while failing to provide a real solution”.

Since the Kyoto Protocol was ratified, most of the discussions on continuing initiatives has involved the G8 (or G8+5) countries, which are Canada, Russia, France, Germany, Italy, United Kingdom, United States, and 5 additional countries (Brazil, China, India, Mexico, South

Africa).⁴ Several U.N. conferences on climate change were held in 2007 and 2008, during which steps were taken towards a successor to Kyoto. During the 2009 Climate Change Conference in Copenhagen, an agreement was developed that does not identify quantitative targets, but does identify goals, intentions and follow-up actions (UNFCCC, 2009). However, no legally binding follow-up agreement resulted from this conference.

4.0 PURPOSE OF INQUIRY

It should be noted that this paper does not seek to answer questions as to the validity of the science related to climate change, and the argument that a reduction in GHG emissions will have a positive effect on the global temperature rise. The potential for a successful global environmental regulatory framework is examined assuming that the benefit predicted through the reduction in emissions is a certainty. The determination of the factual basis for climate change science, and the setting of emission targets based on potential environmental benefits (or the reduction in losses) is outside the scope of this inquiry.

According to Burton *et. al* (2006), “human induced climate change presents societies for the first time with the challenge of adapting to climatic changes forecast but not yet experienced.” As a result of the non-linear and temporally delayed nature of climate change, the development of an effective political mechanism that will be favourable to all countries involved and met with the appropriate sense of urgency can be challenging. Additionally, because climate change is a “tragedy of the commons” situation (Hardin, 1968), where climate protection requires the sustaining of a public resource (incorporating such components as air or water) that all are free to

⁴ <http://www.un.org/wcm/content/site/climatechange/pages/gateway/the-negotiations>

use (Milinski *et. al*, 2006), a solution to the climate problem that is not global in nature will fall short of addressing the intended goals.

To provide background information necessary to explore the role of developing countries in the continued development and implementation of the Kyoto Protocol, emissions data for countries illustrating examples of both highly developed and transitioning economies are shown below. Figure 4-1 shows the total emissions and emissions per capita for four representative countries that are considered highly developed by the International Monetary Fund. Figure 4-2 shows the total emissions and emissions per capita for two of the countries that have the potential to have the greatest impact on climate change in the near future. China and India represent two transitioning economies that are a concern as a result of their high population numbers and rapid industrialization. Both countries have a drive for improved standards of living and global economic status, and have per capita emissions that are rapidly climbing. The ratio between per capita emissions in 1961 and those in 2006 in the United States is 1.2. The same figure for China is 5.5, and for India, 4.6. Emissions data was taken from U.N. (2009).

Figure 4-1: Total and Per Capita Emissions for Highly Developed Countries

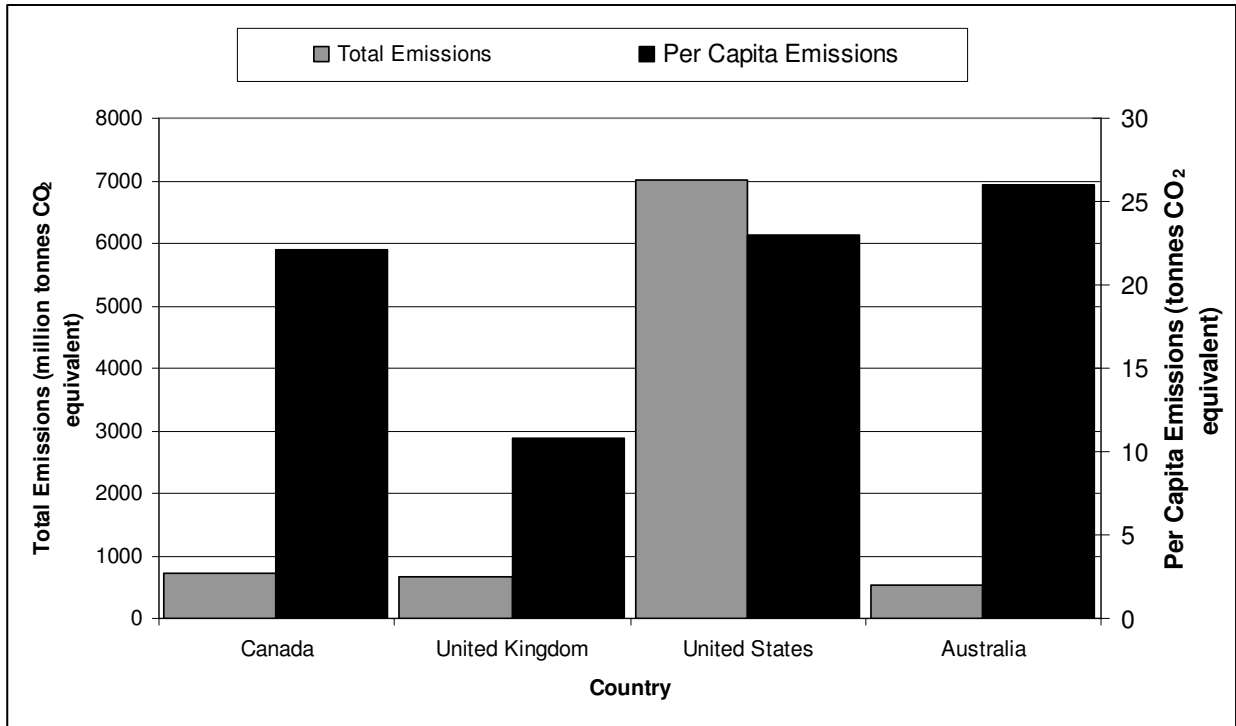
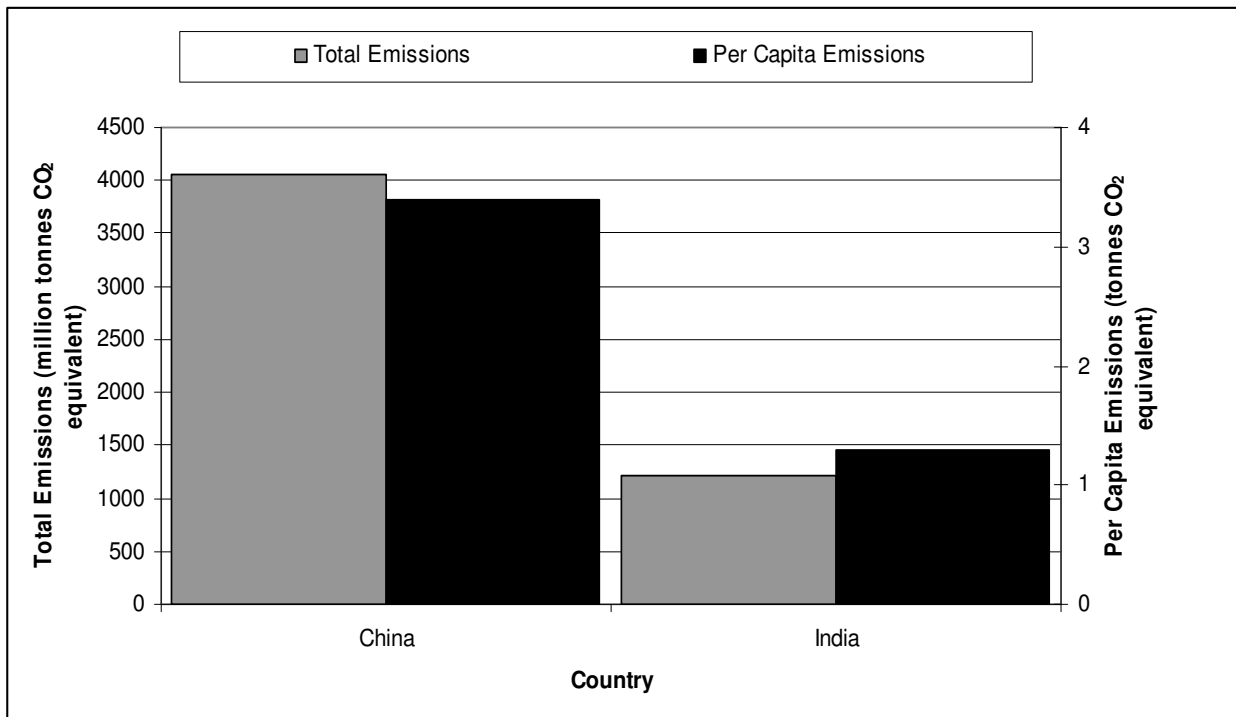
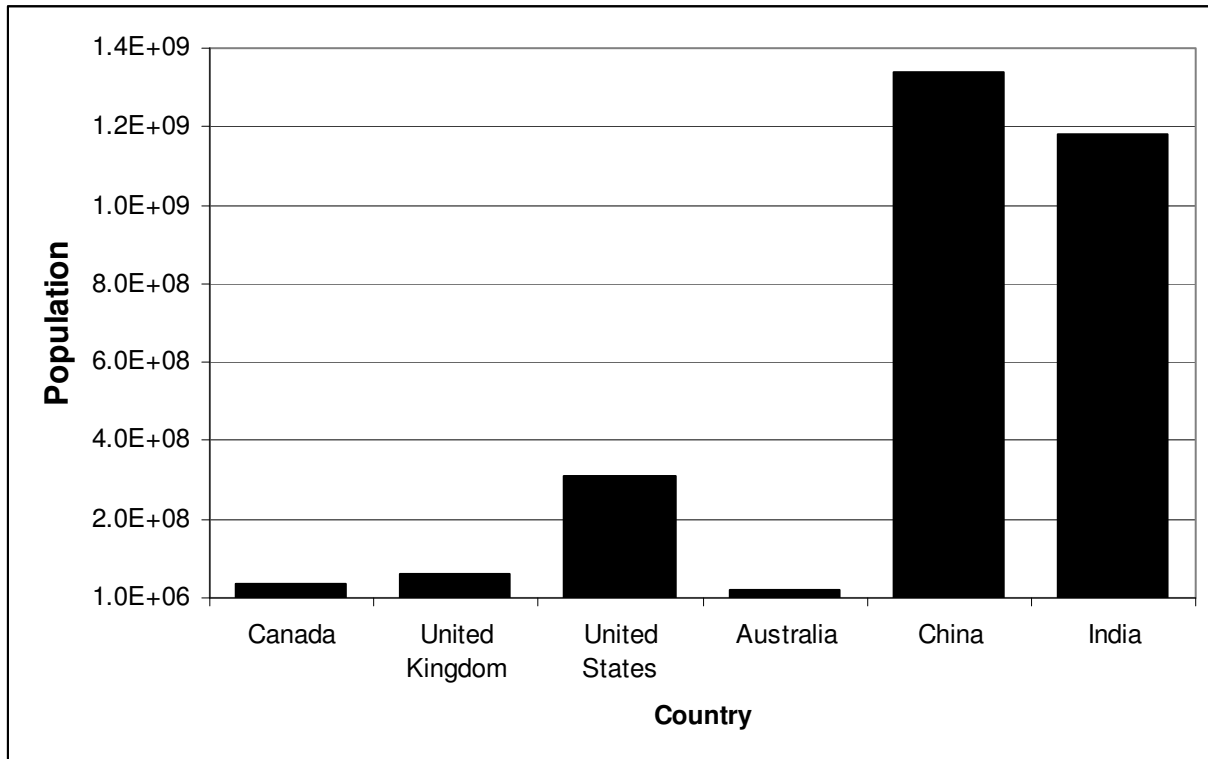


Figure 4-2: Total and Per Capita Emissions for Major Developing Countries



Of greatest concern in the above figures is the ratio between total emissions and per capita emissions, which is representative of the population of the country. Therefore, for a highly developed country, the population would be small relative to global population, and a higher per capita emission could still result in a low total emission value. However, a country with an extremely high population may have a low per capita emission level but would still have high total emissions. An example of this can be seen in China and the United States. The population of China is approximately 20% of the total global population, whereas the population in the U.S. is less than 5%. Even though the per capita emissions in the U.S. are more than seven times those in China, the total emissions of CO₂ from China are higher than those from the U.S. as a result of the discrepancy in population. The effect of larger populations on total emissions is supported by comparing the population values shown below in Figure 4-3 with the total emission values in Figures 4-1 and 4-2.

Figure 4-3: Population Data for Specified Countries

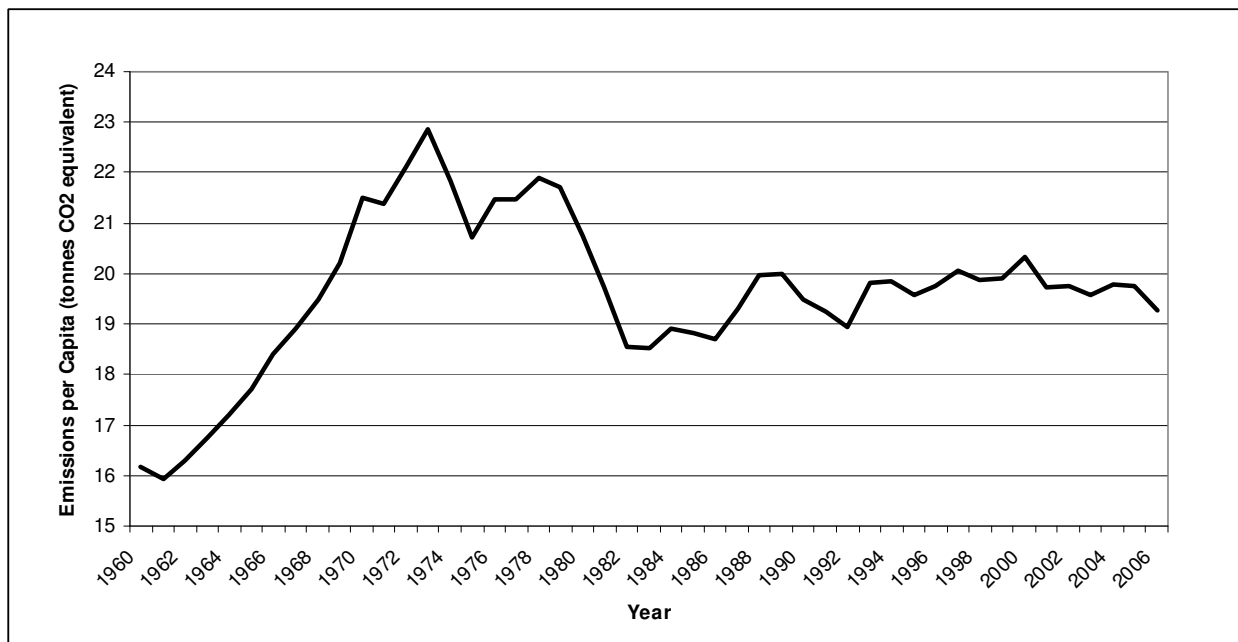


Comparing India and Canada presents another clear indication of this. Though the per capita emissions in India are less than 1/20th of the emissions in Canada, the total emissions are higher because the population is almost 35 times that of Canada (based on data in U.N. (2009)).

A compounding factor is the rapid rise in per capita emission levels in developing countries, particularly countries that are becoming more industrialized such as China or India. Figure 4-4 shows the annual change in per capita emissions between 1960 and 2006 in the United States. Despite some upward and downward trends, the per capita emissions over this time period increased by less than 25%. As can be seen in Figure 4-5, the same graph for China shows a steady climb in emissions from 1960 to 2006, with the rate of increase rising significantly after

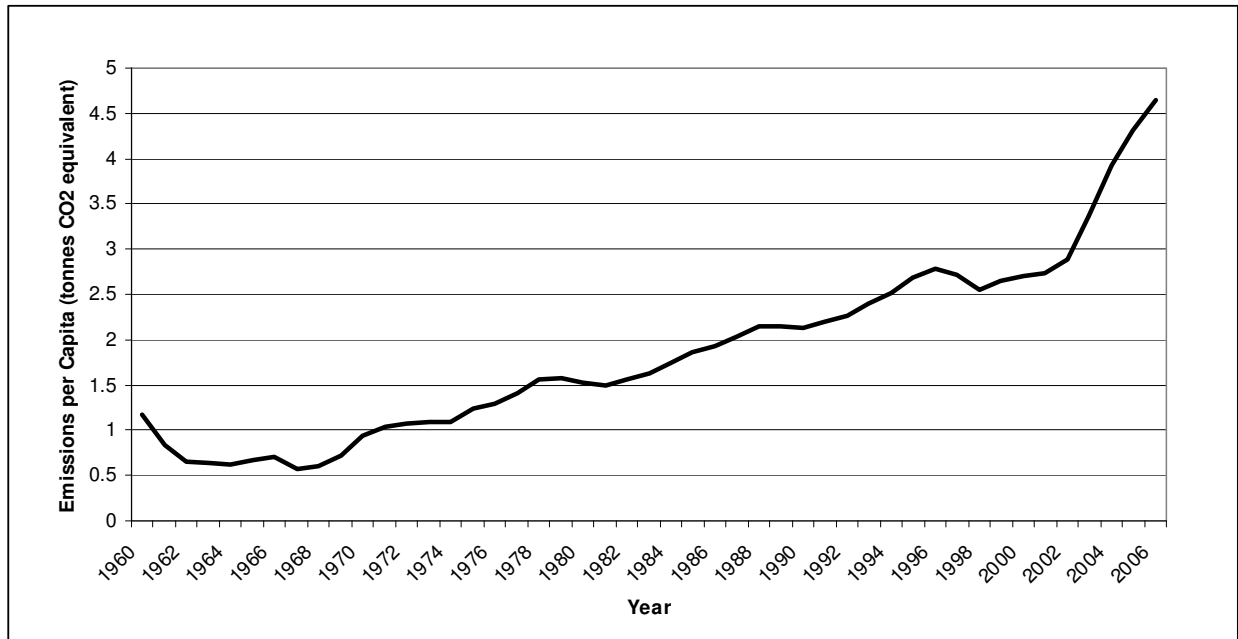
the year 2000.⁵ If India were to have the same per capita emission rate as the United Kingdom, which is the lowest of the developed countries used as examples in this report, India's total annual emissions would be approximately 12,816 million tonnes CO₂ equivalent. Emissions of this level have the potential to have an adverse effect on the global climate, and would represent a more than ten time increase in GHG releases from India.

Figure 4-4: Annual Per Capita Emissions for 1960 to 2006 in United States



⁵ <http://data.worldbank.org/data-catalog>

Figure 4-5: Annual Per Capita Emissions for 1960 to 2006 in China



China, India and other emerging developing countries are expected to represent up to 2/3 of global CO₂ emissions over the course of the century (Frankel, 2008). This exceeds early Organization for Economic Cooperation and Development (OECD) predictions (Frankel, 2008). Implicit in the increasing emissions of these transitioning economies is the relationship between Gross Domestic Product (GDP), which is an indicator of development, and carbon emissions per capita. Figures 4-6, 4-7 and 4-8 show the changes per capita emissions and GDP per capita for the years 1970 to 2007 for China, India and the United States, respectively. All data for the graphs is from World Bank (2008).

Figure 4-6: Emissions and GDP Per Capita from 1970 to 2006 in China

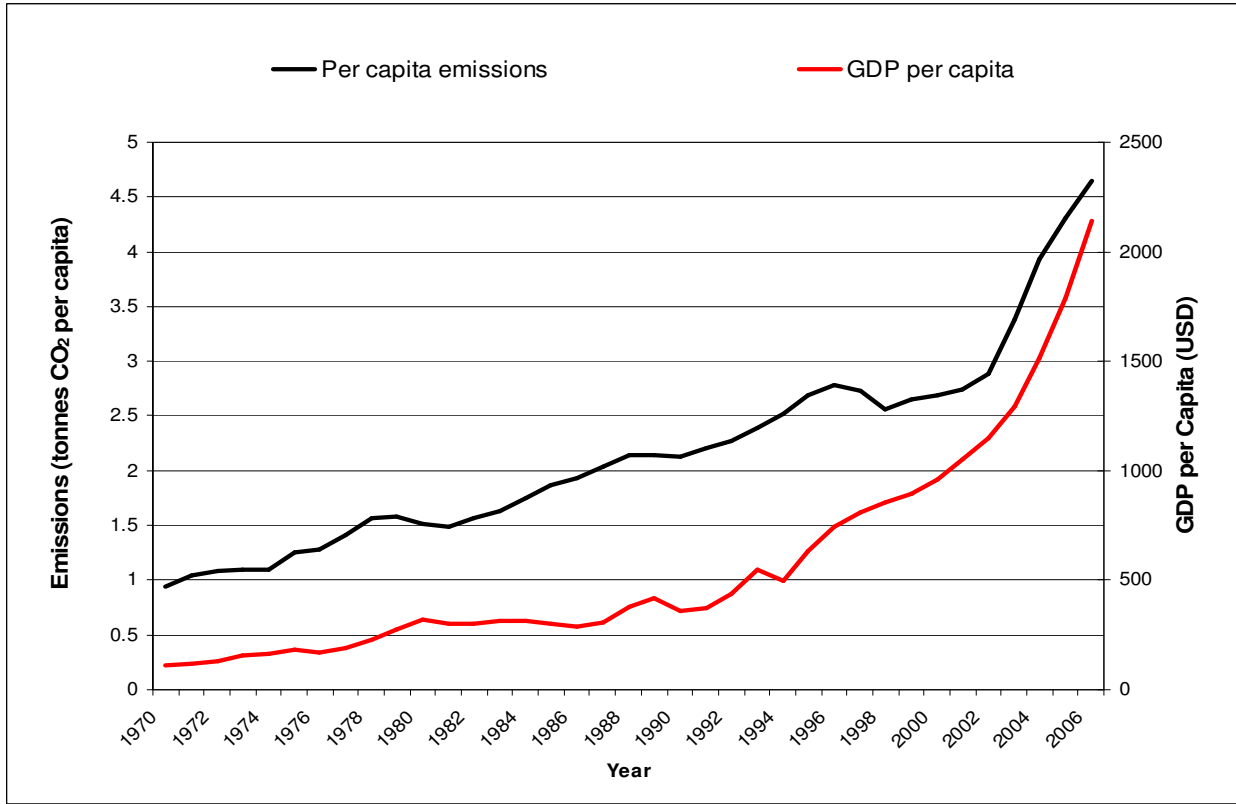


Figure 4-7: Emissions and GDP Per Capita from 1970 to 2006 in India

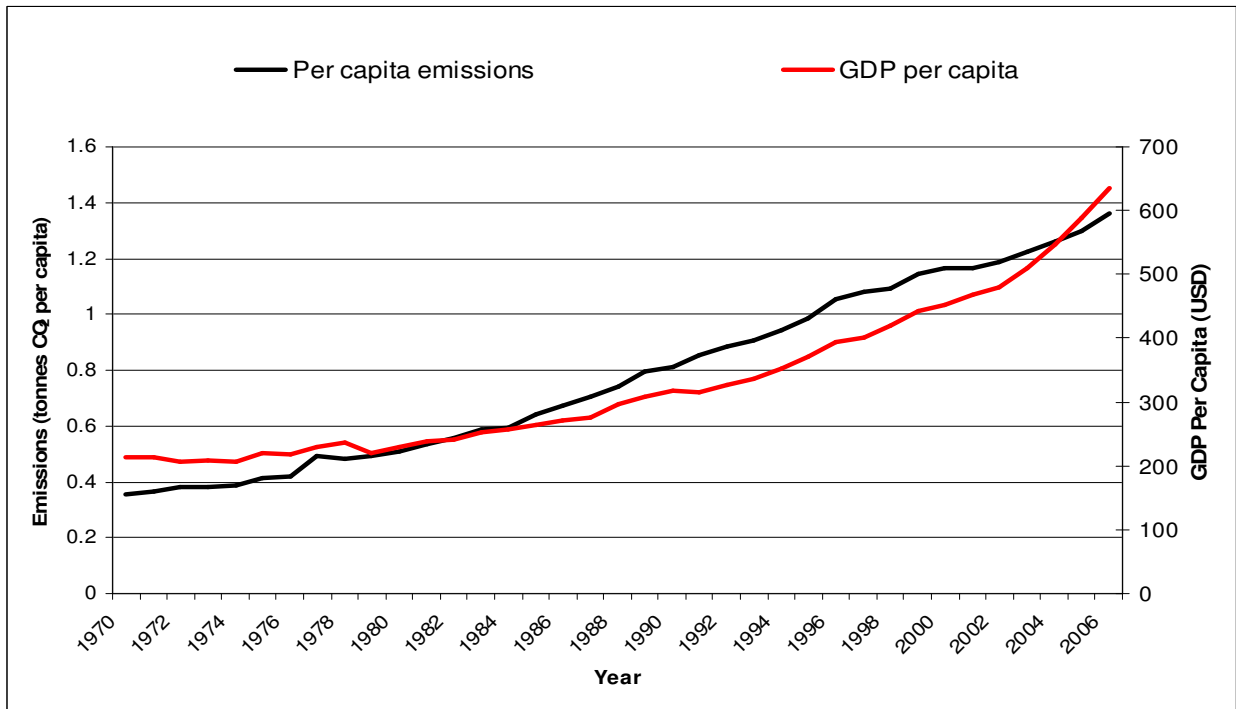
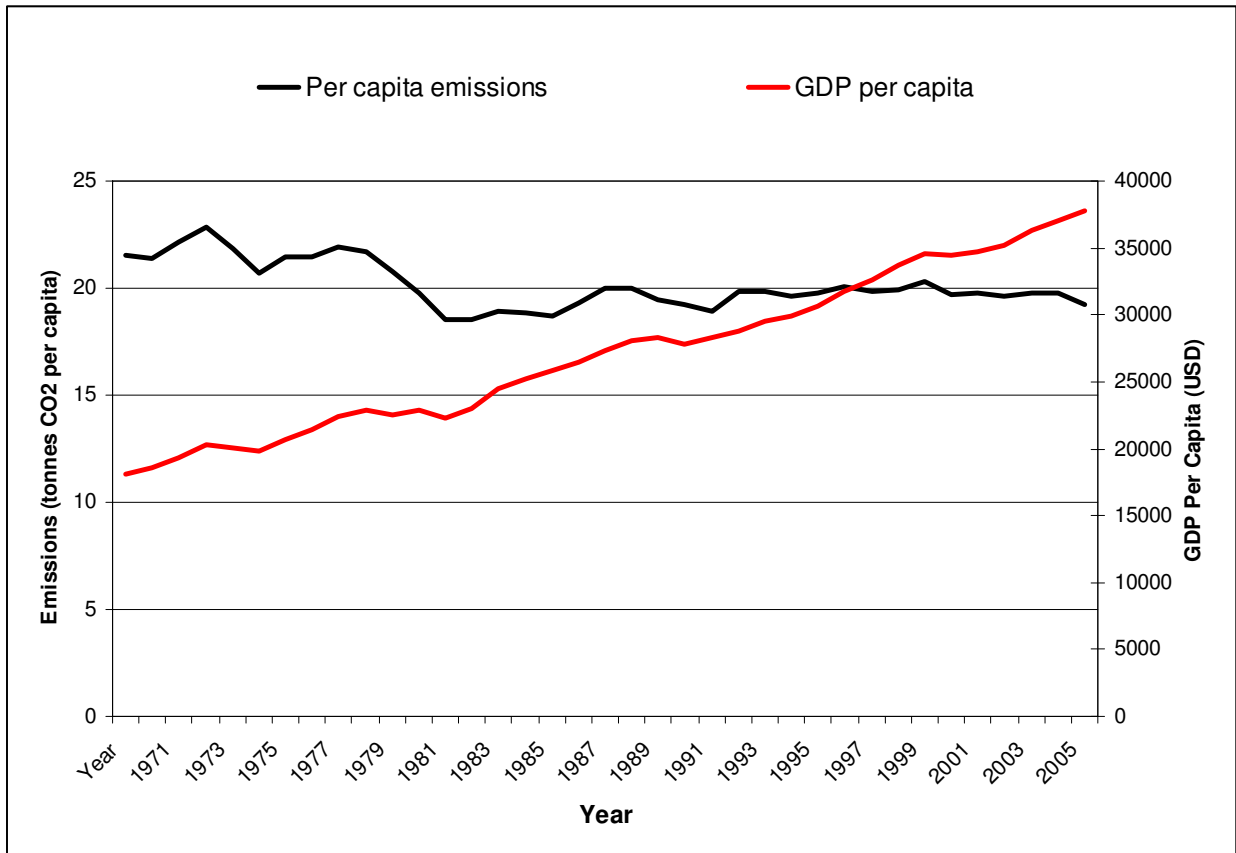


Figure 4-8: Emissions and GDP Per Capita from 1970 to 2006 in United States



As can be seen for China and India, the growth in GDP per capita has been parallel, or near to parallel during the time period shown. The growth in GDP and emissions per capita for the United States is said to have “decoupled” after 1979 when the economy in the U.S. started to shift from an industrial economy to a service based economy (Elsayed, 2009). This shift occurred when the GDP per capita in the U.S. was 10 times the current value in China, and about 300 times that in India. As developing countries work towards a higher standard of living for the people, the GDP per capita will rise, and, given the trend seen in Figures 4-7 and 4-8, it can be expected that the per capita emissions will also rise. However, it should be noted that it is expected that the per capita emissions corresponding with a rise in per capita GDP in many developing countries will not be as high as that seen for developed countries. Developed

countries, as part of the transition to service based industry, have created a demand in developing countries for affiliated businesses, such as call centers (Pradhan and Abraham, 2005). Therefore, a service based industry has been started prematurely in developing countries and may reduce the rise in per capita emissions as the standard of living increases.

As can be seen through the data presented above, the participation of developing countries is therefore required for the success of a future revision of the Kyoto Protocol that would mitigate against climate change and its associated affects and yet allow development of their growing economies and increasing demands for energy.

5.0 CHALLENGES FOR POLICY

Climate change is a trans-boundary concern, which presents unique challenges for regulation and mitigation initiatives. The concept of transnational harm contrasts with the state-centered model of responsibility (Mason, 2008). The mechanisms of accountability usually called upon at a state level, such as levying fines and enforcing monitoring requirements, are not effective at an international level. Conventional regulation mechanisms for the regulation of global environmental damage centered on the principle that states have responsibility to ensure that activities under their jurisdiction do not cause environmental harm to other states or areas beyond state jurisdiction (Mason, 2008). The global nature of climate change has brought up some social, economic and political complications that make it difficult to find common ground. These complications range from the easily apparent, such as the large physical distances between the source of the emission and the potential for adverse effects, to more difficult concepts such as the question of responsibility for current atmospheric GHG concentrations. Burton *et. al*, (2006),

state that “[s]trategic response to the increased risk of climate change must reach into economic, trade, agricultural and resource policy, among others.”

The effectiveness of multilateral policy efforts is blunted by the rules of voluntary consent and non-interference by other states in domestic affairs (Mason, 2008). Additionally, the nature of climate change is such that any policy implemented needs to be proactive and preventative, with targets determined prior to the presentation of hard evidence of their effectiveness. Preventative measures need to take into consideration what is built in the future, and thus may be discriminatory against certain industries that tend towards higher emissions as part of their daily productivity (e.g., coal, automotive). This may lead to economic costs, and the potential for successfully implementing policy initiatives may be challenged by constituencies that are heavily supported by the affected industries, or other citizens concerned about changes in standard of living.

An example of the duality of domestic needs and international commitments can be seen in Canada. Canadian federalism has been seen to be an obstacle for Canada’s significant efforts to meet its Kyoto commitments (Harrison and Sundstrom, 2007). The considerable power of the provinces, and the connections between the auto manufacturing and oil industries in Ontario and Alberta, respectively, has made it difficult for meaningful changes to be undertaken by the federal government. The shales that could be used to produce natural gas in Quebec and British Columbia represent a future source of concern for Canadian environmental policies, as economic and employment opportunities will have to be weighed against emission targets and global responsibility.

Harrison and Sundstrom (2007) indicate that an analysis of international and domestic climate initiatives prior to Kyoto identified that countries with parliamentary systems tended to be more aggressive than those with presidential systems, and had greater success in ratifying international treaties. This was hypothesized to be because the concentration of authority in a parliamentary system allows for personal political affinities to play into final actions taken on agreements. Jean Chretien and Bill Clinton were both committed to climate change and the Kyoto Protocol, but Bill Clinton did not have the institutional capacity to ratify the Protocol on behalf of the U.S. Chretien did have this power, but the commitments were abandoned when the government changed hands.

Climate change is an issue that people tend to be generally supportive of in concept (Harrison and Sundstrom, 2007). However, with respect to climate change, support does not easily make way for action. Harrison and Sundstrom (2007) state that “[w]hile voters tend to be strongly supportive of the idea of compliance with international environmental treaties, they can be simultaneously strongly resistant to the reality of higher taxes or energy prices”. Additionally, nations and individuals are typically unwilling to reduce GHG emissions because they would have to pay the full abatement costs but would only gain a fraction of the benefits. A central point in the discussions regarding the Kyoto Protocol was a desire from all parties involved to address the common pool problem of climate change in a way that does not require them to accept greater costs than other parties (Harrison and Sundstrom, 2007). Economic costs are of great concern, particularly when only some countries are subject to environmental restrictions. Many governments have been willing to join MEAs, but evidence suggests that these agreements are not reliably put into practice, which would involve incorporating treaties into domestic laws,

and developing regulations and enforcement infrastructure. Studies have identified the high costs of compliance as a major factor in the failure to implement the tenets of the MEA (Perkins and Neumayer, 2007). A global environmental agreement that includes both developed and developing countries will have to take into consideration the cost of administering an MEA.

An issue that resulted in the United States not ratifying the Kyoto Protocol is whether countries working towards stringent environmental targets can be competitive with countries that have no responsibility to reduce emissions on a domestic or global scale (Reynolds, 2001). Scope of environmental responsibility comes into question here as well, when a country has the ability to move more polluting activities to a location with less stringent location to avoid domestic consequences. This phenomenon is called leakage (Frankel, 2008) and is discussed in greater detail in Section 5.1. Leakage is most specifically applicable to the relationship between developing countries and developed countries, it is now something that is becoming apparent between multiple developing countries. Due to rising manufacturing costs in China, companies are leaving China to find countries with even cheaper labour like Indonesia (Associated Press, 2008).

There is a potential to infringe upon tenets set forth by the World Trade Organization (WTO) through the implementation of MEAs. With the current Kyoto Protocol scenario, countries with emission restrictions can bypass these limitations through trade with countries whose emissions are not regulated, such as China. This also has the side effect of making goods from unregulated countries less expensive than those from countries that need to invest in more complex manufacturing technologies in order to meet emission targets. Some measures of environmental

quality have been positively correlated by increased trade, such as SO₂ emissions; however, CO₂ emissions have been seen to be exacerbated by increased trade (Frankel, 2008). The solution to the potential for higher CO₂ emissions due to an increased demand for manufacturing in unregulated countries would be to place controls on the goods that can be imported by a country, possibly identifying a relationship between the emissions from manufacturing the good, and the emission limit of the receiving country (i.e. a penalty of a loss of a percentage of allowed emissions as a consequence for direct or indirect investment in a polluting technology).

Restricting trade from a country, however, may trigger an infraction against WTO regulations. In fact, the development of domestic policies that include the provision of possible barriers against imports from countries perceived as non-participating in global climate change mitigation efforts could result in a WTO panel rejecting a major country's domestic climate change legislation (Frankel, 2008). The potential consequences of this scenario would be vast both politically and economically. An example of this occurring at present is the package of market based climate change initiatives introduced by the U.S. during the 110th congress. Almost half of these initiatives call for some border measures, such as a tax to fossil fuel imports or a requirement that imports that were manufactured using energy intensive methods are accompanied by the surrendering of carbon credits for the emissions implicated in their production. These market based initiatives could be considered illegal under WTO regulations unless domestic firms are also penalized for similar reasons (Frankel, 2008).

6.0 THE ROLE OF DEVELOPING COUNTRIES

As indicated in Chapter 4, developing countries have a significant role in the effort to enact global climate change mitigation. Developing countries make up the majority of the global

population and have the potential to be significant political and economical players in the future. As was seen in Section 4.0, GHG emissions from India would be ten times what they currently are if India were to reach the same state of development (and therefore the same emission levels) as the U.K. The emission levels would be even greater if China, which has a larger population, rose to the per capita emission levels of the U.K. Though it is not expected that per capita emission levels in developing countries will reach values as high as the developed countries as a result of the modern technologies available and the introduction of service based industries, a rise is still anticipated.

6.1. The Critical Role of Developing Countries in Reducing Emissions

As was seen in Chapter 4, the per capita emissions in developing countries are expected to rise as the standard of living in these countries rises. Additionally, the higher population in developing countries will amplify the effects of increasing emissions. Therefore, it is critical for the mitigation of climate change and the prevention of further damage that developing countries be the primary users of means to reduce emissions. However, the reduction of emissions in developing countries can be difficult. The prime concern needs to be the increase in standard of living and the development of institutional structure to make the implementation of environmental policy even possible. China has been identified as a key country for enacting emission reductions; however, the Chinese environmental plan has emissions peaking in 2050 (Bosetti and Frankel, 2009). This means that emissions are expected to rise in China until 2050, which represents a large continuing contribution to global CO₂ contributions.

If future amendments to the Kyoto Protocol do not identify means of restricting it from occurring, companies in developed countries, to escape the stringent domestic environmental

regulations, would either move facilities to developing countries where they would not face the same restrictions, or purchase pre-manufactured goods from developing countries. Energy intensive industries could migrate to developing countries. If a plant was run in a developed country that was party to a MEA or to domestic emission limits, the plant would be built to incorporate technologies for the reduction of GHG releases, or toxic waterborne emissions. In a country without these limitations, the plant could be built without any of these considerations, and may actually have higher emissions than if it was built in the developed countries. This phenomenon is called leakage, and involves the migration of dirty production methods to non-participating countries (Frankel, 2008). A potential solution for this concern would be the requirement for member countries of the protocol to require companies to develop a global environmental policy and meet domestic regulations for facilities abroad.

6.2. Concerns Over Equity

Developing countries have so far been resistant to being a part of MEAs such as the Kyoto Protocol. The reasoning for this is that developing countries will not make sacrifices that prevent them from raising standard of living (Valentina and Frankel, 2009). Demerse (2009) compares the atmosphere to a bathtub with the taps turned on. The goal of any future negotiations for climate change is to determine how to split up the remaining space in the bathtub between the nations of the world, to protect those who are getting flooded by the water spilling out (adaptation, discussed in Section 5.3), and to find technologies that will avoid turning the taps on all the way. Developed countries have already benefitted from an unfair advantage in that they have attained levels of per capita emissions that developing countries will not be allowed to attain (Bosetti and Frankel, 2009).

U.S. congress has stated that it will not impose quantitative limits on U.S GHG emissions if it fears that emissions from China, India and other developing countries will continue to grow unabated, yet leaders in India and China have stated that they are not willing to cut emissions until after the U.S and other developed countries have gone first (Bosetti and Frankel, 2009). Poor countries are arguing they should not be denied their turn at economic development (Bosetti and Frankel, 2009).. Therefore, a viable solution for climate change needs to include developing countries, but also needs to incorporate strategies the allow developing countries the opportunity to grow as economies and increase the standard of living of their citizens.

Two major environmental principles are relevant to this situation. The first is the polluter pays principle, which states that the polluter should bear the expenses of carrying out pollution prevention measures or paying for damage caused by pollution. This principle was recognized by the OECD in 1972. The common but differential responsibilities principle states that it is the shared responsibility of countries for protection of shared resources (Demerse, 2009). A caveat to this principle is that responsibility may be different depending on contribution to the problem and capability for addressing it.

6.3. Challenges for Adaptation

The international climate effort to this point has focussed strongly on mitigation measures, and on means for reducing GHG emissions to prevent climate change. Adaptation is the development of plans for the management of climate change effects that cannot be avoided. The UNFCCC indicates that “[a]daptation to the adverse effects of climate change is vital in order to reduce the impacts of climate change that are happening now and increase resilience to future impacts.”⁶

⁶ <http://unfccc.int/adaptation/items/4159.php>

According to Burton *et. al* (2006), substantial new mitigation commitments can only be effective when accompanied by adaptation. The questions of fairness identified in Section 5.2 are also relevant here. Affluent countries would need to be willing to commit resources to assist poor countries to develop and implement adaptation measures.

Adaptive capacity of a country to climate change is reflected in economic status, the existence of strong institutions, and degree of exposure (Burton *et al.*, 2006). Typically, those most vulnerable to climate change are those least able to adapt to it (Burton *et al.*, 2006). Vulnerability is reflected in the key sectors of human health, agriculture, water resources, coastal resources, ecosystems and biodiversity. (Burton *et. al*, 2006) Climate related infectious diseases associated with hot weather conditions can put stress on public health systems. Changes in rainfall or temperature can effect crop yields, water supplies and water quality and species diversity. Proactive adaptation requires a greater initial investment from developed countries to help with these pressing concerns.

Early acknowledgement of the need for assistance with adaptation occurred with the United Nations Framework Conventional on Climate Change (UNFCCC), where all parties committed generally to undertake adaptation measures and to co-operate in preparing for the potential impacts of climate change. An initiative developed to attempt to set priorities for financial assistance involved the provision of funding to the 40 least developed countries to prepare National Adaptation Programs of Action (NAPAs). However, the result of the adaptation efforts under the UNFCCC resulted in an irregular patchwork with many different unrelated initiatives (Burton *et. al*, 2006). A significant constraint to date has been lack of funding. The UN

Development Program estimates that current contributions from developed countries to adaptation for countries in need is 26 times less than what is needed by 2015 (Demerse, 2009). Therefore, it is critical that any proposed policy structure for a global MEA includes consideration of adaptation needs for all countries, especially lower income states.

7.0 REVIEW OF POLICY PROPOSALS

No single country can address the problem on its own, for the reasons indicated previously in this inquiry. While there is a very important role for domestic actions on climate change, in the long term, multilateral action is a necessary means of addressing the problem. Adly *et. al* (2003) identify six criteria that can guide an assessment of proposed global climate policy regimes:

- (1) the environmental outcome;
- (2) dynamic efficiency (achieving net benefits over time);
- (3) dynamic cost-effectiveness;
- (4) distributional equity (both cross-sectional and intertemporal);
- (5) flexibility in the presence of new information; and
- (6) participation and compliance.

These criteria are intended to be used in the development of an evaluation of the potential efficacy of an MEA.

These concerns need to be considered in the development of a post-Kyoto MEA that includes global participation. Bosetti and Frankel (2009) provide a very comprehensive proposal for climate change policy. Their proposed policy identifies three key constraints for the agreement to be successful: 1) developing countries are not asked to bear any costs in the early years; 2) thereafter, they are not asked to make a sacrifice that is different in kind or degree that the

countries that have already started to reduce emissions, with allowance included to account for differences in income levels; and 3) no country is asked to accept a target that will cost more than a set percentage of their income during a specified budget period.

In their proposed policy architecture, developing countries will be asked to maintain their GHG emission levels at or below the Business as Usual (BAU) concentrations that have been predicted for each state. The BAU is defined as “the rate of increased emissions that these countries would experience in the absence of an international agreement, as determined through expert projections.” (Bosetti and Frankel, 2009) In subsequent phases of the agreement, developing countries will be asked to reduce their emissions to below BAU levels. The BAU targets for countries that are still not reducing emissions will be updated to account for changes in technology and methodology, and a mechanism will be set in place for the approval of these values. Bosetti and Frankel (2009) propose that when per capita income in a country exceeds \$3000 per year, or when per capita annual emissions approach 1 tonne, the country will be required to start reducing emissions below BAU levels. These values were selected because, when applied to the majority of countries, the resulting predicted economic losses were within the identified acceptability criteria. The goal would be a gradual convergence of per capita emissions across the world over the course of the century. Additionally, the BAU targets imposed on developing countries would prevent leakage, as the movement of energy intensive processes to developing countries to avoid emissions in one place would result in an increase in emissions above the BAU levels in the host country.

Bosetti and Frankel (2009) have identified the following five desirable attributes for a new global environmental agreement:

- 1) The agreement must have comprehensive global participation (including developing countries);
- 2) The agreement must include market initiatives, such as permit trading to allow market incentives for developing countries;
- 3) The agreement must have mechanisms to ensure dynamic consistency, so that it is independent from changes in state leadership or concerns regarding credibility;
- 4) The agreement should take equity into consideration with respect to the costs to countries to implement the agreement; and
- 5) Compliance mechanisms should be incorporated into the agreement and compliance should not be reasonably expected if the cost to a country for implementation is unreasonable when compared to income.

Olmstead and Stavins (2006) agree with these five components and also indicate that emphasis on an extended time path (and not just short periods of time in isolation) is necessary for achieving the goal of reducing emissions as well.

The result of implementing the proposed agreement would be that emissions in wealthy countries would decline rapidly from the years 2020 to 2050, and emissions in developing countries would continue to rise for a bit longer and then decrease more gradually (Bosetti and Frankel, 2009). A by-product of this mechanism would also be a gradual rise in the price of carbon, which would

be reflected in the prices of gasoline, home heating oil and electric power (Bosetti and Frankel, 2009). Another side effect that is postulated is that some countries, in particular Sub-Saharan Africa, would experience economic gain from the ratification of a global MEA. This is because these countries will have carbon credits that they will now be allowed to trade or sell. Since the total emissions in these developing nations are so low, there is the potential for sale of carbon credits to wealthy countries struggling to meet their emission targets.

Mason (2008) indicates that global environmental policy needs to consider the potential effects prior to them occurring, and incorporate preventative measures such as the deterrence of new investment in coal or other industries that cause adverse environmental effects. A delegated model of accountability is preferred, with an international organization entrusted with selected governance functions by the participating states. The MEA should include the “formulation of transferable accountability standards, the design of effective monitoring mechanisms and identification of penalties needed to deter non-compliant behaviour.” (Mason, 2008) Olmstead and Stavins (2006) propose that flexible, long-term targets are needed to guide the magnitude of short term targets. Also suggested is the use both emission targets and intensity targets (i.e. emissions per unit GDP) for the development of emission limits. The development of domestic regulatory structures geared towards meeting any global environmental commitments is a critical component in the success of climate change policy. The conception of lower level governments as implementers and national governments as policy makers created fragmented policies and may inhibit the effectiveness of policies ratified on a federal scale (Bulkeley and Moser, 2007). An external body would provide a “consistent thread of action” (Bulkeley and Moser, 2007) so that initiatives could be taken in a rapid and organized manner.

The World Trade Organization (WTO) is an example of a multi-lateral agreement, and an international body, that functions successfully in managing the global rules of trade between nations (WTO, 2009). Implementation of these trade rules is achieved through the use of a representative process, where decisions must be accepted by all member countries and ratified by their parliaments (WTO, 2009). Disputes are handled through a dispute resolution system, and the fundamental basis for the WTO is a series of agreements that have been signed and ratified by all party countries, similar to the Kyoto Protocol. The WTO agreements contain special provisions for developing countries “including longer time periods to implement agreements and commitments, measures to increase their trading opportunities, provisions requiring all WTO members to safeguard their trade interests, and support to help them build the infrastructure for WTO work, handle disputes, and implement technical standards.” (WTO, 2009) However, due to the concrete nature of the goods and services to which the WTO jurisdiction applies, it is easier to enforce the agreements that encompass the global trade rules than it would be to enforce global environmental restrictions. Additionally, members of the WTO are motivated by potential economic gain to abide by the applicable requirements. Regardless, the model of representative membership, where each country has a voice in the decision making process, should be considered in the development of a central body for the implementation of global environmental policy.

8.0 CONCLUSIONS

Bulkeley and Moser (2007) state that international agreements provide only a partial means through which the mitigation of climate change can be directed. State and non-state actors (such as private companies working on innovative new technologies and non-governmental organizations) will play key roles in climate change. However, a global MEA is still a critical

component in the promulgation of effective climate change mitigation and adaptation mechanisms. Bulkeley and Moser (2007) ask “if climate protection becomes everyone’s responsibility, does it end up being no one’s?” The only possible answer to this question is that everyone needs to take responsibility so it does not end up being lost in the political and economic shuffle of international negotiation. Additionally, a consensus on global priorities needs to be achieved in order to determine the interactions between climate change mitigation, adaptation and the global economy. The next revision to the Kyoto Protocol needs to find a way to develop firm targets and take the global nature of climate change into consideration.

The ratio between existing and required economic resources to fight climate change is estimated to be between 1:10 and 1:100, indicating a significant shortfall in the available funds (Demerse, 2009). The management of these costs will require substantial inputs from wealthier nations. However, preliminary work is being done to identify and quantify the benefits of implementing climate change policy. Bulkeley and Moser (2007) identify the potential for efforts to reduce emissions to result in benefits, such as the diversification of the energy supply, regeneration of communities, and improvement of infrastructure. The Pew Center for Global Climate Change (2010) is working on methodologies for assessment the costs of climate change avoided through the implementation of mitigation measures. The use of methods such as cost-benefit analysis is complicated when applied to climate change because of the long-term, global and uncertain nature of changes to the global climate. However, the conclusion remains that the prospects of increasing learning through waiting to develop a firm regulatory system mitigating climate change do not justify a delay in reducing GHG emissions (Pew Center, 2010).

Demerse (2009) says that “[t]he cost of curbing global warming is dwarfed by the cost of the damage that unchecked climate change would cost.” Therefore, a strong regulatory agency implemented to enforce a comprehensive revision to the Kyoto Protocol is required, with consideration inherent in the detailed policies for the high costs anticipated for compliance, particularly for developed countries. This amendment should identify responsibilities for all of the signatory countries, regardless of political or economic status, and should strive to close the gaps in the Kyoto Protocol, such as the exclusion of international aviation and marine transport emissions from consideration. “The enormity of the crisis cries out for strong binding pollution reduction targets by all countries and massive infusions of public and private capital to catalyse a fast-track transition to a low-carbon economy.” (Lubber, 2009) Only prescriptive, binding and truly global initiatives will be able to successfully accomplish this level of coordination and truly effect change.

9.0 REFERENCES

- Aldy, J.E., S. Barrett and R. Stavins, 2003. *Thirteen Plus One: A Comparison of Global Climate Policy Architectures*. March 3.
- Associated Press, 2008. *Companies leave China as manufacturing costs rise*. February 21. Accessed at: http://www.usatoday.com/news/world/2008-02-21-china-manufacturing_N.htm
- Bosetti, Valentina and Jeffrey Frankel, 2009. *Global Climate Policy Architecture and Political Feasibility: Specific Formulas and Emission Targets to Attain 460 PPM CO2 Concentrations*. The Harvard Project on International Climate Agreements. Discussion Paper 09-30. September.
- Boyd, David Richard, 2001. *Canada vs. OECD: An Environmental Comparison*. University of Victoria.
- Bulkeley Harriet and Susanne C. Moser, 2007. Responding to Climate Change: Governance and Social Action beyond Kyoto. *Global Environmental Politics* 7:2. Massachusetts Institute of Technology. May.
- Burton, Ian, Elliot Diringer and Joel Smith, 2006. *Adaptation to Climate Change: International Policy Options*. Prepared for the Pew Center on Global Climate Change. November.
- Demerse, Clare, 2009. *Our Fair Share: Canada's Role in Supporting Global Climate Solutions*. The Pembina Institute. April.
- EKOS Research Associates, 2002. Presentation on: *Public Attitudes Towards the Kyoto Protocol*. June 10th. Accessed at: <http://www.ekos.com/admin/articles/10June02KyotoProt.pdf>
- Elsayed, Samah, 2009. How are trends in emissions related to changes in GDP? February 20. Accessed at: <http://earthtrends.wri.org/updates/node/336>
- Frankel, Jeffrey, 2008. *Global Environmental Policy and Global Trade Policy*. The Harvard Project on International Climate Agreements. Discussion Paper 08-14. October.
- Hardin, Garrett, 1968. "The Tragedy of the Commons," *Science*, 162(1968):1243-1248.

- Hare, Bill. 1999. *Undermining the Kyoto Protocol: Environmental Effectiveness versus Political Expediency*. Conference on “Implementing the Kyoto Protocol”, Royal Institute of International Affairs, 14-15 June, Chatham House, London. Greenpeace.
- Harrison Kathryn and Lisa McIntosh Sundstrom, 2007. The Comparative Politics of Climate Change. *Global Environmental Politics* 7:4. November.
- Hollo, Erkki J., Kari Kuusiniemi, Eriika Melkas, and Michael Mehling, 2002. *Legal Aspects of Climate Change: Instrument Choice and the Kyoto Mechanisms*. Finish Global Change Research Program.
- IPCC 2007. Summary for Policymakers. In: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyers (eds)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC 2007. Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tognor and H.L. Miller (eds)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Lubber, Mindy S., 2009. Is the Copenhagen Agreement a Disappointment or a Relief? Financial Times. December 19th. Accessed at: <http://www.greenbiz.com/blog/2009/12/21/copenhagen-agreement-disappointment-or-relief#ixzz0ukokmsw9>
- Mason, Michael, 2008. The Governance of Transnational Environmental Harm: Addressing New Modes of Accountability/Responsibility. *Global Environmental Politics* 8:3. Massachusetts Institute of Technology. August.
- Milinski, Manfred, Dirk Semmann, Hans-Jurgen Krambeck and Jochem Marotzke, 2006. *Stabilizing the Earth's Climate is not a Losing Game: Supporting evidence from public good experiments*. Proceedings of the National Academy of Science, vol 103, no. 11. March 14.
- Munoz, Miquel, Rachel Thrasher and Adil Najam, 2009. Measuring the Negotiation Burden of Multilateral Environmental Agreements. *Global Environmental Politics* 9:4. Massachusetts Institute of Technology. November.
- Olmstead, Sheila, M. and Robert N. Stavins, 2006. *An International Policy Architecture for the Post-Kyoto Era*. AEI Brookings Joint Center for Regulatory Studies. January.

- Pradhan, Jaya Prakash and Vinoj Abraham, 2005. Social and Cultural Impact of Outsourcing: Emerging Issues from Indian Call Centers. *Harvard Asia Quarterly*. Volume IX, No. 3. Summer.
- Perkins Richard and Eric Neumayer, 2007. Implementing Multilateral Environmental Agreements: An Analysis of EU Directives. *Global Environmental Politics* 7:3. August.
- Pew Center for Global Climate Change, 2010. *Workshop Summary Report: Assessing the Benefits of Avoided Climate Change: Cost-Benefit Analysis and Beyond*. March 16-17, 2009. Washington DC. May.
- Reuters, 2010. *ANALYSIS: "Below" 2C opens new rift in U.N. climate battle*. March 30. Accessed at: <http://www.alertnet.org/thenews/newsdesk/LDE62T0YW.htm>
- Reynolds, Paul, 2001. *Kyoto: Why did the U.S. pull out?* BBC News. March 30. Accessed at: <http://news.bbc.co.uk/2/hi/americas/1248757.stm>
- Saxe, Dianne, 2008. *Are There Legal Consequences if Canada Breaches Kyoto?* Accessed at: http://workcabin.ca/index.php?option=com_content&task=view&id=121&Itemid=43
- Ulfstein, G. and Jacob Werksman, 2005. The Kyoto Compliance System: Towards Hard Enforcement, in Stokke, O.S., J. Hovi and G. Ulfstein, *Implementing Climate Regime: International Compliance*, Earthscan, London, pp. 39-62.
- United Nations, 2009. *Environmental Indicators: GHGs*. August. Accessed at: <http://unstats.un.org/unsd/ENVIRONMENT/qindicators.htm>
- United Nations, 1992. *United Nations Framework Convention on Climate Change*.
- United Nations Environment Programme, 1988. *The Vienna Convention for the Protection of the Ozone Layer*.
- United Nations Environment Programme, 1989. *Montreal Protocol on Substances That Deplete the Ozone Layer*.
- United Nations Framework Convention on Climate Change (UNFCCC), 2005. *The Kyoto Protocol*. February 16.
- United Nations Framework Convention on Climate Change (UNFCCC), 2009. *Copenhagen Accord*. December 18.

United Nations Framework Convention on Climate Change (UNFCCC), 2010. An Introduction to the Kyoto Protocol Compliance Mechanism. Accessed at http://unfccc.int/kyoto_protocol/compliance/items/3024txt.php

Wapner, Paul, 2003. World Summit on Sustainable Development: Towards a Post-Jo'burg Environmentalism. *Global Environmental Politics 3:1*. February.

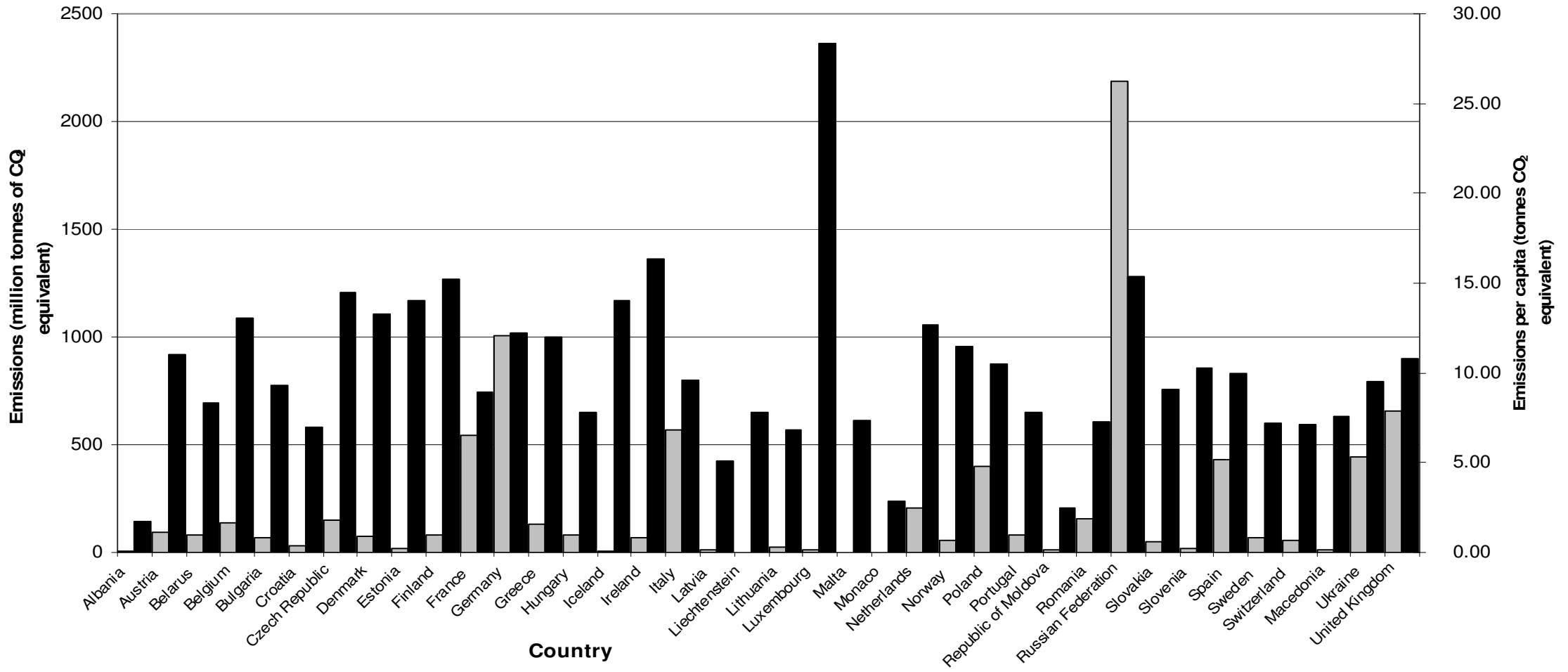
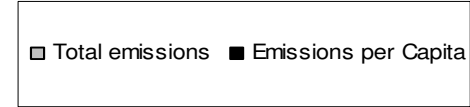
The World Bank, 2008. Development Data Group. *2008 World Development Indicators Online*. Washington, DC: The World Bank. Available at: <http://go.worldbank.org/U0FSM7AQ40>.

World Trade Organization (WTO), 2009. *The World Trade Organization...In Brief*. Accessed at: http://www.wto.org/english/thewto_e/whatis_e/inbrief_e/inbr00_e.htm

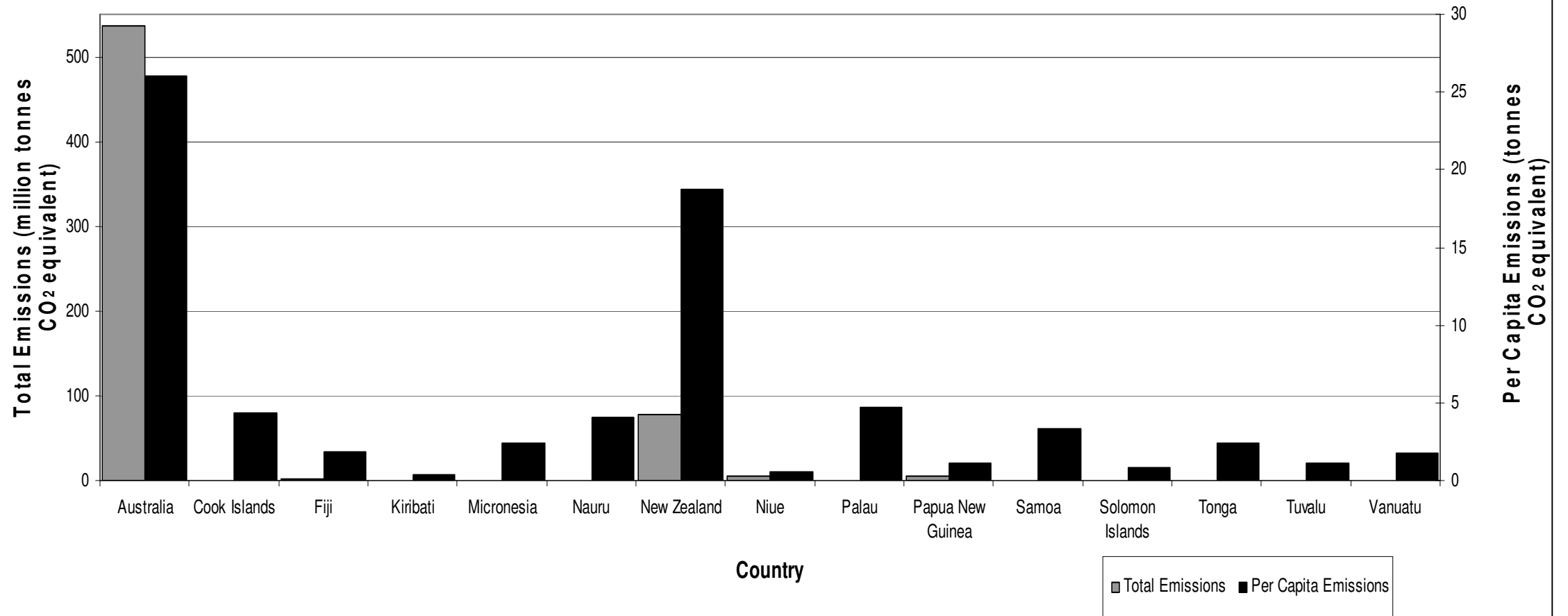
APPENDIX

TOTAL AND PER CAPITA EMISSIONS FOR ALL REPORTING COUNTRIES BY CONTINENT

Total and Per Capita Emissions for Europe

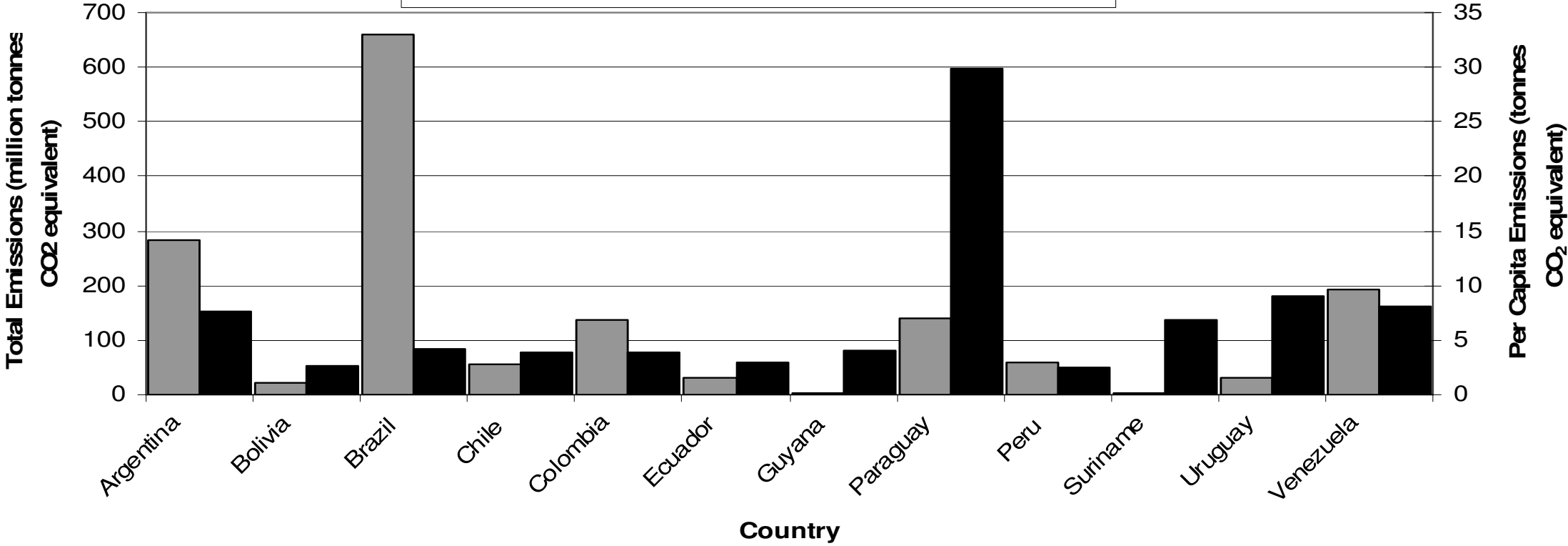


Total and Per Capita Emissions - Oceania

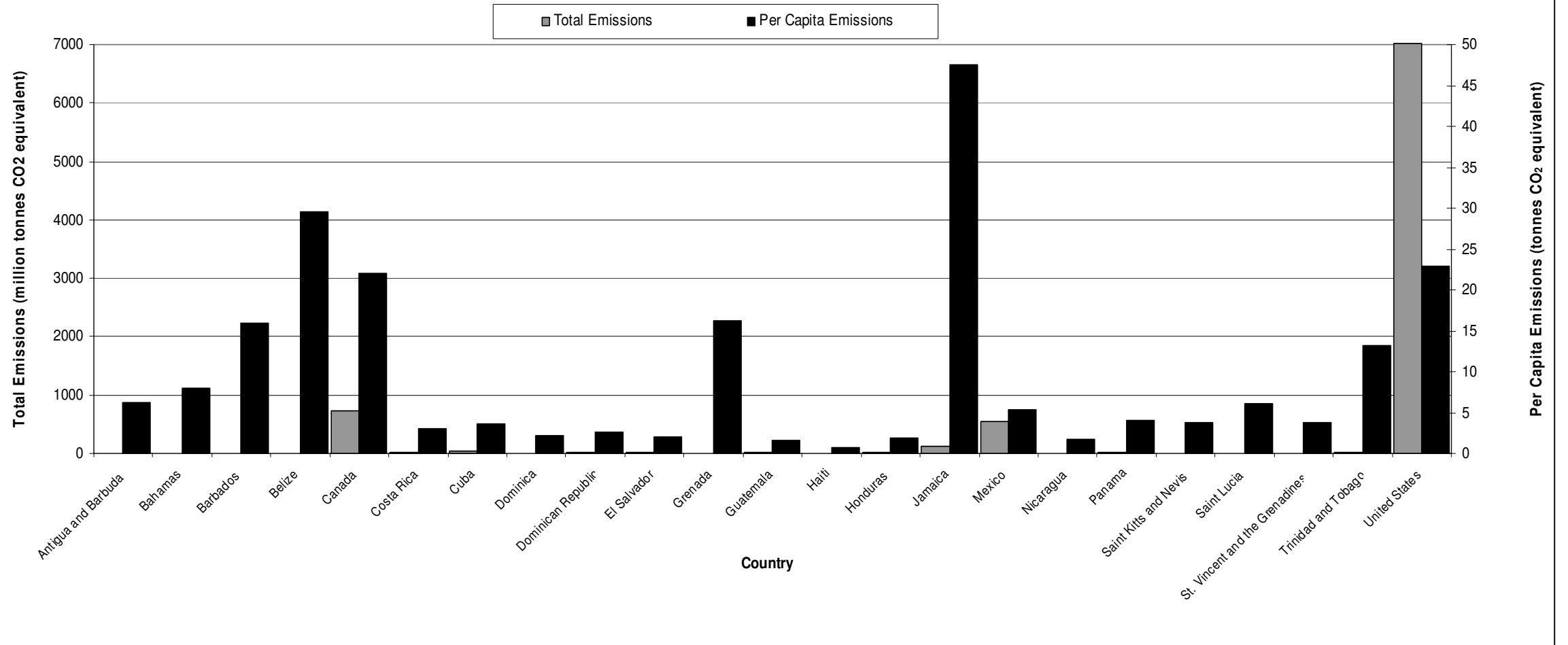


Total and Per Capita Emissions for South America

Total Emissions
 Per Capita Emissions

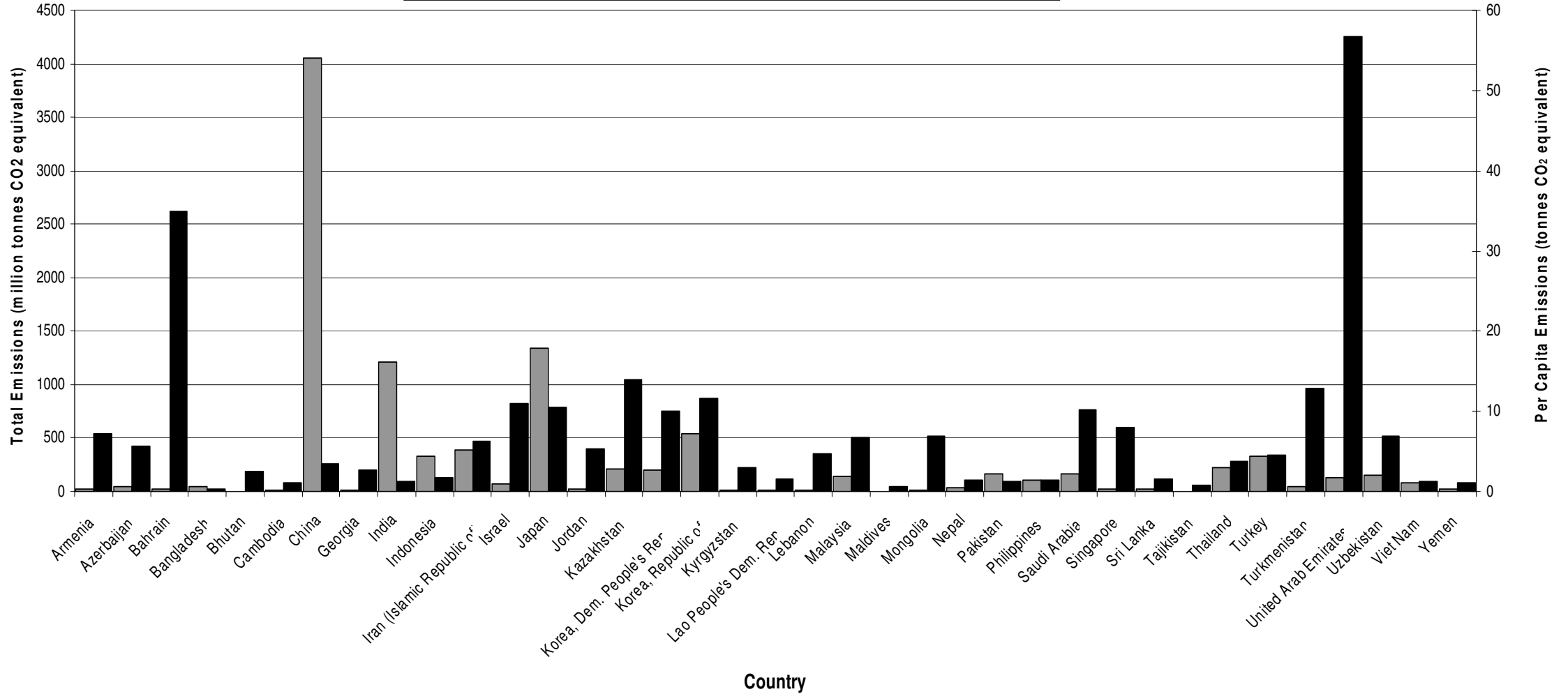


Total and Per Capita Emissions for North America



Total and Per Capita Emissions for Asia

Total Emissions
 Per Capita Emissions



Total and Per Capita Emissions for Africa

