Climate Negotiations After the Copenhagen

Overview of Emissions Targets
and the
Copenhagen 5 and Russia

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Summary

No International Treaty at the COP-16

It is highly unlikely that the COP-16 in Cancún, Mexico, in December 2010 will result in an international binding climate treaty. The U.S. climate negotiator, Todd Stern, said in May that it was politically unrealistic for the next climate treaty to impose global targets on greenhouse gas (GHG) emission reductions. Earlier in the year outgoing UN climate chief, Yvo de Boer, claimed that a legally binding climate change treaty will not emerge from the Copenhagen Accord until COP17 in South Africa in November 2011. The BASIC ministers believe that a legally binding outcome should be concluded in South Africa by 2011.

The incoming UN climate chief, Christiana Figueres, of Costa Rica faces widening a split between rich and poor nations over how to mitigate and adapt to climate change. Figueres says that she wants developed nations to keep their pledges of more aid to developing countries, and she intends to rebuild trust between developed and developing nations and in the UNFCCC process

Erroneous Climate Targets and Assumptions

The international climate negotiations and any potential climate policy thus far are based on very serious and erroneous assumptions about the physical constraints of the planet Earth, its resources, and carrying capacity:

1. proposed targets for atmospheric GHG concentrations and global temperature rise are much too high to prevent catastrophic climate change;

2. the intentions and commitments of the international community are woefully insufficient to seriously mitigate dangerous anthropogenic climate change;

3. the competing and conflicting economic and social agendas of most nations are in complete conflict with the supportive capacity of a stable climate system – and ultimately their own national interests;

4. the international community is making the calamitous assumption that there is enough global oil supply to continue fueling their various agendas for unlimited economic growth and development (i.e., business as usual), and that this presumed unlimited oil supply will contribute to future GHG emissions.

Greenhouse gas emissions reduction pledges submitted to the UNFCCC as part of the Copenhagen Accord process are insufficient to limit temperature increase to 2°C relative to pre-industrial global mean temperatures. Only a few reports have analyzed the emissions reductions goals expressed by various nations in their submissions to UNFCCC as part of process laid out in the Copenhagen Accord. ***All of these analyses make an incorrect assumption that a target atmospheric GHG concentration of about 450 ppm CO_2e would more or less guarantee that global average temperature rise would be limited to 2°C.***

The IPCC claims that a concentration of 450 ppm CO_2e (400 ppm CO_2) would only provide approximately a 50% chance (within a probability distribution of 26 – 78%) of remaining below a dangerous global average temperature rise of 2.1°C above pre-industrial global average temperature with a "likely in the range" of 1.4 – 3.1°C rise. The 2007 IPCC estimates are considered very conservative, in part, because they underestimate climate sensitivity, climate forcing mechanisms, and feedback cycles. ***The recommended 450 ppm CO_2e stabilization target should be accepted as an upper limit – but not necessarily a safe limit – to atmospheric GHG concentrations.***

The climate system may have already passed the 2°C threshold. Cumulative GHG emissions may have committed the planet to a warming of 2.4ºC (within a range of 1.4º – 4.3ºC) above the pre-industrial surface temperatures. ***As CO_2 concentrations approach 441 ppm a corresponding committed warming of 3.1ºC will occur by 2030 in the absence of strong countervailing mitigation.*** According to James Hansen, a CO_2 concentration of order 450 ppm or greater, if long maintained, would push the Earth toward an ice-free state and that "such a CO_2 level likely would cause the passing of climate tipping points and initiate dynamic responses that could be out of humanity's control".

Achieving a 2°C target with at least a likely chance (>66%) would require a long-term stabilization below 400ppm CO_2e (350 ppm CO_2). At 400 ppm CO_2e, the mean probability of exceeding 2°C is 28%. A target of stabilizing greenhouse gas emissions at 350 ppm CO_2e (approximately 300 ppm CO_2) would reduce the mean probability of exceeding a 2°C temperature rise to 7%. Therefore, a target atmospheric concentration of GHGs of no greater than 400 ppm CO_2e will likely be needed to prevent the world from passing climate tipping points. However, ***a target concentration of 350 ppm CO_2e (300 ppm CO_2) may be needed to ensure that the climate does not pass the 2ºC threshold.***

According to the analysis for "Global 80% Reduction", global GHG emissions should be no greater than approximately 30 Gt per year CO_2e by 2020, and no more than 3 Gt CO_2e per year by 2050 through 2100. ***The "Confirmed Proposals" and "Potential Proposals" are 24 and 20 Gt CO_2e per year less than necessary, respectively.***

There is also one other ultra-critical assumption that the scientific and international community, and the climate negotiators are making: ***Economic and emissions projections generally assume that there is an unlimited supply of oil and other fossil fuels to fuel unlimited economic growth and development. Given that global peak oil production likely occurred in 2008 or by 2011 (with global oil supply shortages predicted by 2012 to 2015) and that global demand for oil is growing rapidly, it is probable that business as usual (unlimited economic growth, environmental degradation, and GHG emissions) beyond the next few years will be impossible as the global oil-based economy enters a rapid and permanent decline.*** Therefore, in addition to making the wrong assumptions about atmospheric GHG concentration and global temperature targets, the international community is assuming that anything resembling business as usual is actually possible.

With peak oil, there is a high probability that our integrated and globalized civilization is on the verge of a

rapid and near-term collapse. Once peak oil production causes the collapse of the global economy and threatens the lives and livelihoods of countless billions of people, ***it is possible that climate negotiations may be abandoned or at least marginalized for a long time (if not permanently) as the crisis of peak oil overwhelms the stability and security of every nation.*** In this context, the greatest threat to having successful and meaningful climate negotiations may not be the self-interested motivations and political impasse of the international community, but rather the possible panic and lack of political will that will likely ensue once peak oil shock takes effect. In this case, ***it will likely require a concerted and transcendent effort on the part of any remaining international climate negotiators, their governments, and the public to pursue a meaningful international climate policy*** – much less a binding international climate treaty.

Clearly, ***the international community and climate negotiators urgently need to review and reconsider the science and data regarding climate change and energy supplies. Then, they need to have a truly honest discussion on how to realistically manage the two impending and unprecedented crises confronting the world***. If this reassessment and discourse does not occur, not only will the international climate negotiations be ineffective, if not entirely destined to failure, human security and the stability of every society will be gravely threatened by these systemic crises.

Emergence of the Copenhagen 5 (C-5)

The emergence of a recent negotiating bloc – the so-called Copenhagen 5 (C-5) – during the COP-15 in Copenhagen has changed the dynamics of climate geopolitics. The C-5 consists of the U.S. and the BASIC group of nations (Brazil, South Africa, India and China). The leadership by the so-called Copenhagen 5 (C-5), who represent approximately 45% of the global population and about 44% of global GHG emissions, form a new geopolitical alliance and reflects a transition to a new geopolitical order in climate negotiations.

BASIC

The BASIC group of nations (Brazil, South Africa, India and China) represent approximately 28% of the world's GHG emissions (China – 16.36%, Brazil – 6.47%, India – 4.25%, South Africa – 0.98%). ***The BASIC group has emphasized that the Copenhagen Accord has no legal basis.*** India's environment minister, Jairam Ramesh said, "We support the Copenhagen Accord. But all of us were unanimously of the view that its value lies not as a standalone document but as an input into the two-track negotiation process under the United Nations Framework Convention on Climate Change (UNFCCC)." The BASIC ministers noted that internationally binding legal agreements already exist in the UNFCCC and its Kyoto Protocol

The BASIC group insists that such climate agreements must include an agreement on quantified emission reduction targets under a second commitment period for Annex I Parties under the Kyoto Protocol, and a legally binding agreement on long-term cooperative action under the Convention. Without binding emissions reductions for the developed nations, the BASIC bloc is reluctant to accept new targets. The BASIC group asserts that equity will be a key issue for any agreement.

The BASIC group calls for the early transfer of fast-start finance of the $10 billion pledged by developed

countries at the COP-15 – with a focus on the least developed countries, small island developing states, and African nations – "as proof of their commitment to urgently address the global challenge of climate change". BASIC also calls for the implementation of the REDD+ mechanism; architecture of technology development and transfer; adaptation framework encompassing implementation programs; and a work program on measurement, reporting and verification (MRV) of commitments to finance, technology and capacity building support by developed countries, starting with a common reporting format for financial contributions by developed countries.

Brazil

Brazil's GHG emissions pledge for the Copenhagen Accord would continue to increase atmospheric GHG concentrations. Brazil has the potential to become one of the world's largest oil producers within the next couple decades, which would contribute to continued growth in global GHG emissions. ***Brazil's commitment to unlimited economic growth, its belief that it "can produce more and emit less", and its desire to supply the global market with its oil, natural resources, and exports is antithetical to reducing its contribution to climate change – indeed, it will very likely contribute to climate change.*** Due to deforestation, environmental degradation and climate change forcing, Brazil's policy of economic growth, oil production, and globalized trade will also threaten the integrity of the Amazon rainforest, which is a critical regulator of global climate, a major carbon sink, a major producer of the planet's oxygen, an important supplier of ecosystem services, and a critical ecosystem for the countless species throughout the world that depend on it.

In 2005, Brazil was the 4th largest emitter of GHGs (including LULUCF and international bunker fuel), or 6.47% of the world's total GHG emissions. Brazil has pledged to support the Copenhagen Accord with pledges to reduce its GHG emissions by 36.1% below BAU by 2020, and reduce its rate of deforestation by 70% below 2009 levels by 2017. If there is a significant global commitment action against climate change, then Brazil pledges to reduce its GHG emissions by 38.9% below BAU by 2020, and to reduce deforestation to zero by 2020. During the period from 1990 – 2005, Brazil's average annual growth rate of GHG emissions (including LULUCF) was 0.8%, which is a total growth of 13.2% for that period. This is comparable to the GHG emissions average annual growth rate for the same period of the U.S. (1.0%); and the total growth for the U.S. (15.8%). ***With an average annual growth rate of 0.8%, Brazil's GHG emissions pledges of 36.1% (or 38.9%) by 2020 would amount to an average annual growth rate of approximately 0.5% (or slightly less than 0.5%) by 2020.***

China

China's insistence on using fossil fuels to sustain unlimited economic growth and unsustainable development is reflected in the China's Copenhagen Accord pledge to reduce its emissions based on the proportion of its GHG emissions per unit of GDP. Rather than basing its national emissions pledges on absolute emissions targets, China is committing itself to a very vague emissions target since GDP is an approximate and controversial measure of a nation's overall economic output. For example, if the goal of China's economic activities are to produce environmentally sustainable increases unlimited economic growth, poverty alleviation, and in the overall human standard of living, then coupling GHG emissions targets solely with GDP can be a rather meaningless measurement since GDP treats GHG emissions and the loss of ecosystem services as a benefit instead of a cost.

It is very challenging to know China's motivations, intentions, and the sincerity of its Copenhagen Accord commitments. Nevertheless, China's uncharacteristic decision to take a high-profile role in recent global climate discussions indicates an increasing willingness to expose itself to the potential benefits and risks of international climate negotiations. ***Understanding China's motivations will be critical in order to identify areas of potential conflict and mutual benefit in international climate policy and negotiations.***

In 2005, China was the largest emitter of GHGs (including LULUCF and international bunker fuel) in the world, or 16.36% of the world's total GHG emissions. During the period from 1990 – 2005, China's average annual growth rate of GHG emissions was 4.3%, which reflects a total growth of 88.8% for that period. From 1990 – 2005, China's average annual growth of GHG intensity (GHG emissions per unit of GDP), excluding LULUCF, decreased from 2,879.6 tCO2e per million 2005 international dollars (M Intl$ 2005) to 1,361.3 tCO2e per M Intl$ 2005. This represents an average annual growth rate of -4.9%, for a total growth of -52.7% during this period.

China pledged to reduce its emissions intensity (GHG emissions per unit of gross domestic product (GDP)) by 45% by 2020 compared to its 2005 level; increase the share of non-fossil fuels (e.g., renewable energy) in primary energy consumption to approximately 15% by 2020; increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from 2005 levels; and if there is a significant global commitment to act against climate change, then China pledges to achieve peak GHG emissions in 2030, and then reduce GHG emissions to 2005 levels by 2050. ***If China achieves its goal of reducing its emissions intensity by 45% by 2020 compared to its 2005 level, then China's emissions intensity in 2020 would be 748.72 tCO2e per M Intl$ 2005, which would be significantly greater than the emissions intensity of the U.S. in 2005.***

India

India is adamant on its positions to domestically increase energy consumption, and to promote economic growth and development for its more than a billion people. In India, poverty eradication through economic development is a national priority. The goal of poverty eradication has driven India's economy to grow very rapidly. Approximately 80% of India's population of 1.1 billion in 2007 (over 800 million people) live on less than U.S.$ 2 per day. Economic development is driving energy demand and consumption in India. Approximately half of India's commercial primary energy demand is supplied with coal; and coal supplies about 38% of India's total primary energy.

India is also adamant on its insistence that the Indian government will not agree to any legally-binding emissions reduction targets for India, nor to any legally-binding emissions peaking year for India. India maintains that a global climate goal should be expressed only in terms of a limit in global temperature increase – and not in terms of quantified emissions reduction targets that could result in a binding commitment for developing countries. In effect, India is promising to commit nothing to mitigate its absolute GHG emissions or its land use policies, or to cooperate with the international community on avoiding dangerous anthropogenic climate change, since it is basing its emissions reduction pledge on its GDP and a policy of unlimited economic growth – unless some nation or some group of nations can provide a very convenient solution to the climate problem while ensuring that everyone in India can live a standard of living similar to that of developed nations (or at least above poverty).

South Africa

Regardless of whether South Africa will fulfill its potential pledges (contingent on receiving aid from developed nations) to reduce its GHG emissions, and despite its intentions to 'green' its economy, ***the South African government has clearly indicated that it intends to continue its economic development in such as way that would make the GHG emissions of South Africa comparable to the current emissions levels of a developed western nation such as France or Australia.***

South Africa has not yet produced a national climate change policy. The government's Department of Environmental Affairs (DEA) stated a "firm intent" to complete South Africa's national climate change policy white paper by the end of 2010. ***Some of the discussion on how to design a national climate change policy includes considering letting businesses, its energy-intensive industries, and the market self-regulate***, which may make achieving effective GHG emissions reductions challenging depending on how well regulated business and industry become.

With an average annual growth rate of 1.6%, South Africa's GHG emissions reduction pledges of 34% below BAU by 2020 would amount to an average annual growth rate of approximately 1.1% until 2020. By 2025, South Africa's average annual growth rate would amount to approximately 0.93%. Therefore, ***by 2020 and 2025, South Africa's average annual growth rate would be comparable to that of the U.S. during the period from 1990 – 2005.*** Assuming that South Africa achieves its potential pledge to peak and then stabilize its GHG emissions from 2025 – 2035 at 34% and later 42% of BAU, South Africa's total annual GHG emissions would be about 548.7 MtCO2e per year from 2025 – 2035. This is comparable to the annual GHG emissions of France (573.5 MtCO2e) and Australia (569.9 MtCO2e) in 2005.

Russia

Since the Copenhagen Accord is based on voluntary mitigation targets and lacks significant long-term goals, it does not conflict much with the national interests of the Russian government. The involvement of Russia in international climate negotiations and policy is very important since Russia is a major GHG emitter, and international climate policy would affect the international energy market and the profitability of its fossil fuel industry. ***It is likely that Russia will create a challenging negotiation environment as it may attempt to negotiate over the sale of its surplus Kyoto Protocol emissions allowances and over its proposed forest carbon sinks.*** Now that Russia has these surplus emissions allowances, it has much to lose and little to gain in this respect.

Russia's clear priority for the modernization and growth of its economy will make international climate policy subordinate to its national agenda. If Russia cannot maintain its emission credits and privileged used of flexible market instruments, it may adopt an opt-out strategy. This strategy could undermine a binding legal approach to international climate policy by supporting a combination of domestic voluntary targets and international compliance. ***Russia may be more willing to negotiate if its interest in economic modernization is addressed.*** In which case, international cooperation and flexible instruments in energy efficiency, energy savings, and renewable energies may be very effective negotiating terms.

With an average annual growth rate of -2.6%, and a total growth of -33.1% below 1990 levels in 2005, Russia's GHG emissions pledges of 15% below 1990 levels by 2020, and then by 50% below 1990 levels by 2050, clearly indicate that Russia has no intention to significantly reduce its emissions trends. Essentially, ***Russia is stating in its Copenhagen Accord pledges that its policy will not change from business***

as usual.

U.S.

The involvement of the U.S. in international climate policy is essential for a successful international climate regime. Consequently, ***international climate negotiations and the UN process are being slowed as the international community waits for U.S. climate legislation to pass.*** Until then, the U.S. cannot commit to any binding targets or meaningful international climate policy. In addition, other nations will not agree to an international climate regime without the participation of and commitments from the U.S.. Until U.S. domestic policy on climate and energy is legislated by Congress, it is unclear whether and when the U.S. will make any binding international commitments. ***This international impasse is made worse by the U.S. stance that international commitments should conform with U.S. national legislation; rather than letting national legislation be subordinate to international climate policy.*** Until the U.S. Congress can accept an international legally binding agreement, international climate negotiators will have to concentrate on taking pragmatic steps in the short- and medium-term.

With an average annual growth rate of 1.0%, the GHG emissions pledges of the U.S. to reduce emissions by 17% of 2005 levels by 2020 would require an average annual growth rate of approximately -1.3% between 2005 – 2020. However, assuming BAU from 2005 – 2020, U.S. annual GHG emissions would rise from 6948.2 MtCO2e in 2005 to 8066.6 MtCO2e by 2020, which represents a total growth of 16.1% for that period. Therefore, in order for the U.S. to reduce its GHG emissions to 17% below 2005 levels by 2020, the U.S. would have to reduce its average annual growth of emissions by about 2.3% per year (i.e., -2.3% increase per year) from 2005 – 2020 below BAU. This -2.3% average annual growth in GHG emissions from BAU is comparable to the -2.6% average annual growth of GHG emissions reported by the Russian Federation for the period from 1990 – 2005, which was partially a result of Russia's economic collapse in the early 1990's.

However, in 2010, ***the U.S. projected that its annual GHG emissions will grow by 4% from 2005 – 2020. Based on these projections, in order to reduce emissions by 17% of 2005 levels by 2020 the U.S. would require an average annual growth rate of approximately -3.3% between 2005 – 2020. This is comparable to the decline in emissions from 1990 – 2005 experienced by the Eastern European nations Bulgaria, Belarus, Romania, and Bosnia and Herzegovina; which coincided with their political and economic collapse.*** In order for the U.S. to achieve its goal of 17% reduction in emissions levels below 2005 by 2020, this would suggest that the U.S. would have to substantially increase its energy efficiency and adopt a large scale “green” energy-based economy and/or reduce its economic growth for a sustained period of time, all of which seems unlikely considering the current U.S. political and economic agendas.

"We underline that climate change is one of the greatest challenges of our time."

~ Copenhagen Accord

While many argue that the COP-15 in Copenhagen was a failure or at best a marginal success, and that the Copenhagen Accord was either a null and void agreement that undermined the UNFCCC process or a significant first step toward creating a binding international treaty, there is at least one notable quality about the Accord – the international community clearly documented a belief that it should urgently stabilize atmospheric greenhouse gas (GHG) concentrations at a level that would prevent dangerous anthropogenic interference with the climate system by keeping the increase in global temperature to below 2 degrees Celsius (°C). While it is debatable whether an average global 2°C increase above pre-industrial temperatures is indeed a safe level of warming, it is a significant step in moving the world forward in mitigating climate change. Moreover, the Accord also includes a clause that allows for the consideration of strengthening the long-term mitigation goal to prevent a temperature rises of 1.5°C, which is considered by scientists and many nations to be the maximum safe level of global warming. By recognizing that a target of 1.5°C, the internal community has at least nominally acknowledged that even 2°C may be an unsafe target.

The former Executive Secretary of the UNFCCC, Yvo de Boer optimistically stated, "The Copenhagen Accord is not least significant because it includes a clear pledge by industrialised nations to provide short-term and long-term finance for developing countries for adaptation and mitigation. At the same time, it is clear that the Accord can be used to help advance the formal negotiations towards a successful outcome in Mexico (UNEP 2010)."

Over 100 UNFCCC parties have either associated themselves with the Accord or submitted pledges to the Secretariat. The Accord and the texts that came out of the two UNFCCC negotiating tracks (Kyoto Protocol and Long-term Cooperative Action) might provide a sufficient enough basis to allow for the creation of one or more new legally binding instruments. Nations will likely continue to disagree over whether the optimal outcome of the Accord should be a new protocol, an amendment to the UNFCCC, or a revision of the Kyoto Protocol. Nonetheless, the Accord may offer political guidance and an impetus to push for the implementation of its substance, while offering an opportunity to conclude one or both negotiating tracks in the future.

There seems to be an overall agreement that the UNFCCC is the only legitimate multilateral forum for concluding a global climate deal. Nevertheless, the UNFCCC is not the only forum in which nations can inspire and develop discourse and policy. With the release of the Copenhagen Accord, there is now a clear precedent for bilateral and multilateral discussions and negotiations to run in parallel to and to facilitate the UNFCCC process.

Indeed, the emergence of a recent negotiating bloc during the COP-15 in Copenhagen has already changed the dynamics of climate geopolitics. The leadership by the so-called Copenhagen 5 (C-5), who represent approximately 45% of the global population and about 44% of global GHG emissions (CAIT

2010), form a new geopolitical alliance and reflects a transition to a new geopolitical order in climate negotiations. The C-5 has begun to sideline the European Union's more traditional leadership role in international climate negotiations, and has given cause for concern for developing nations who feel that the larger economies represented by the C-5 may try to dominate the UNFCCC process and the international climate, energy, and economic agenda.

The incoming UN climate chief, Christiana Figueres, of Costa Rica faces widening a split between rich and poor nations over how to mitigate and adapt to climate change. Figueres says that she wants developed nations to keep their pledges of more aid to developing countries, and she intends to rebuild trust between developed and developing nations and in the UNFCCC process (Doyle and Wynn 2010). A document prepared for the next UN climate negotiations in Bonn, Germany, shows some of the splits over climate policy after the COP-15. For instance, the text includes the addition of demands by Bolivia that rich nations to cut their GHG emissions by 100% from 1990 levels by 2040, which would be a politically impossible goal of carbon neutrality for developed nations (Doyle and Wynn 2010).

Process questions will ideally be sorted out before the COP-16 in Cancún, Mexico, so that negotiators are negotiating substance rather than disputing the process. In December 2010, if successful by any measure, the COP-16 will focus on reaching decisions that strengthen and improve the institutional, procedural, and legal framework around the commitments that the national governments made during and after COP-15. Despite any disagreements with the substance of the negotiations between nations, a successful conference in Cancún would at the very least help to build trust between nations that commitments will be honored.

Action on financial pledges will likely be critical for making progress on other issues in the coming climate negotiations. The Accord outlined two significant funding commitments from developed nations to developing nations that collectively finance activities such as mitigation, adaptation, deforestation reduction (REDD+), and technology development and transfer. The first commitment is an upfront fast start investment of $30 billion over the next three years. The second pledge is a long-term commitment of $100 billion per year by 2020. Optimally, the COP-16 will establish an improved finance mechanism and a system for accounting how nations finance their pledges.

The Accord commits nations to “the immediate establishment of a mechanism including REDD-plus, to enable the mobilization of financial resources from developed countries (UNFCCC 2009).” Negotiators created a first draft on some of the main components of such a mechanism, which would ideally be finalized and adopted at the COP-16 to help guide interim finance processes. Although it is imperative for nations to develop and agree on financial and mitigation (e.g., REDD+) mechanisms, it is just as critical to develop a functional system through which to implement the pledged funds. This finance system should afford developing nations the flexibility to develop and implement national adaptation strategies that are both appropriate for their nations' specific circumstances and that complement their sustainable development.

In addition to financial goals, the Accord establishes a Technology Mechanism “to accelerate technology development and transfer in support of action on adaptation and mitigation that will be guided by a country-driven approach and be based on national circumstances and priorities (UNFCCC 2009).” Technology development and transfer will likely need to involve a combination of an international policy and bilateral and multilateral cooperation in order to adequately deal with the often conflicting priorities of international assistance and the market interests of the private sector.

The Accord has specific language for both developed and developing nations regarding the measurement, reporting and verification (MRV) of financial and emissions reduction commitments. Developed nations are committed to MRV "in accordance with existing and any further guidelines adopted by the Conference of the Parties, and will ensure that accounting of such targets and finance is rigorous, robust and transparent (UNFCCC 2009)." While it may be challenging, if not impossible, for nations to agree on how to integrate MRV into the formal negotiations in Cancún to ensure that commitments and actions taken by both developed and developing nations are fair and transparent, an agreement as to how nations report their financing and reduction pledges would likely build trust among the international community for other issues in Cancún and future negotiations.

Although the Copenhagen Accord's provisions do not have any legal standing within the UNFCCC process, the Accord does have an increasing political importance. Recent submissions from the Parties indicate that they expect the Accord to offer significant guidance in the next stages of climate negotiations. Further, the Accord and its appendices already have an important functional role. The Secretariat has listed the letters of association and the appendices on the UNFCCC official website. The UNFCCC intends to prepare and publish a more final version of the Accord that will include Parties' names. The UNFCCC has developed a registry of Accord targets and actions that allows the international community to assess and compare the commitments of each Accord participant and the conditions under which each nation is prepared to follow through on their pledges.

Nevertheless, a number of UNFCCC parties object to both the content of the Accord and the process by which it was agreed. Undoubtedly, the various parties to the UNFCCC that have either remained silent or have rejected the Accord as illegitimate will continue to raise procedural objections to using it in the continuing negotiations. The reluctance of some nations to associate with the Copenhagen Accord after the COP-15 was in part an attempt to ensure that the Accord did not take on a legal or procedural status beyond what was intended. Some nations clearly noted in their submissions to the UNFCCC Secretariat that they were not satisfied with the Accord's content and the manner in which it was concluded. Some nations, including the BASIC group (Brazil, South Africa, India and China), also wanted to ensure that the Accord was not used to start a legal or procedural process that might replace or run in parallel to the UNFCCC process.

While some people were hopeful that the COP-16 in Cancún, Mexico, in December 2010 would result in an international binding climate treaty, it seems highly unlikely that this outcome will be realized. The U.S. climate negotiator, Todd Stern, said in May that it was politically unrealistic for the next climate treaty to impose global targets on GHG emission reductions (Tandon 2010). Earlier in the year outgoing UN climate chief, Yvo de Boer, claimed that a legally binding climate change treaty will not emerge from the Copenhagen Accord until COP17 in South Africa in November 2011 (Gomez 2010). The BASIC ministers believed that a legally binding outcome should be concluded at the COP-16 in 2010, or at the latest in South Africa by 2011 (BASIC 2010b). However, on 25 May 2010, Xie Zhenhua, who led China's delegation in Copenhagen, said that negotiators aim to agree to a binding global pact on climate change by the end of 2011 (Graham-Harrison 2010), which indicates that it is very unlikely that a binding agreement will be agreed on at the COP-16 in Mexico in 2010. Xie stated, "Everyone is now taking pragmatic measures, and working hard in a positive manner, in order that we can achieve a legally binding agreement at next year's meeting in South Africa (Graham-Harrison 2010)." He also said, "...we have not set in advance a goal that we must draw up a legally binding treaty (German Marshall Fund 2009)."

Despite all of the fanfare and the proclaimed sense of urgency of the international climate negotiations, and in particular the COP-15 and the Copenhagen Accord, there is an alarming discrepancy between the scientifically established target atmospheric GHG concentrations, associated GHG emissions, and global temperature increase above pre-industrial levels, on the one hand; and the targets that each nation and their climate negotiators are fighting over, on the other. That is to say, climate negotiators are dogmatically quarreling over the wrong targets (in far excess of safe climate limits) that they cannot even agree on (see "A New Analysis Using More Accurate Assumptions").

The climate system may have already passed the 2°C threshold (see "A New Analysis Using More Accurate Assumptions"). Given that as of 2005, when atmospheric CO_2 concentrations were already about 380 ppm (~422 ppm CO_2e), GHG emissions may have committed the planet to a warming of 2.4ºC (within a range of 1.4º – 4.3ºC) above the pre-industrial surface temperatures (Ramanathan and Feng 2008). While scientists have unequivocally stated that atmospheric GHG concentrations should not exceed 350 ppm CO_2e (or at the very most 400 ppm CO_2e) (Meinshausen 2006; Moss et al. 2008; Hansen et al. 2008), and that the average global temperature increase above pre-industrial levels should not exceed 1.5°C to 2°C – climate negotiators and climate policy analysts are at best advocating for a target GHG concentration of 450 ppm CO_2e or more under the erroneous belief that at this concentration global average temperatures will stabilize at 2°C. Moreover, they are not even able to succeed at agreeing over these unrealistic and dangerous targets. While it may be politically unfeasible to advocate and negotiate for lower and more realistic targets, it is appropriate to emphasize that the Earth's climate system is not at all concerned about politics, economic development, or the quality of human life. Given that the international community will not likely agree to a *meaningful* and *sufficient* binding climate treaty within the next few years, and that such a treaty may be too little too late in terms of mitigating cataclysmic climate change, the international climate negotiations will need to honestly reevaluate its targets and priorities, or else commit the world to catastrophe.

Nevertheless, there is also one other ultra-critical assumption that the scientific and international community, and the climate negotiators are making: Economic and emissions projections generally assume that there is an unlimited or nigh-limitless supply of oil and other fossil fuels to fuel unlimited economic growth and development (Höök, Sivertsson, and Aleklett 2010). Given that global peak oil production likely occurred in 2008 or by 2011 (with global oil supply shortages predicted by 2012 to 2015) and that global demand for oil is growing rapidly (Macalister 2010, 2009; U.S. JFC 2010; Auzanneau 2010; ITPOES 2010; Ruppert 2009), it is probable that business as usual (unlimited economic growth, environmental degradation, and GHG emissions) beyond the next few years will be impossible as the global oil-based economy enters a rapid and permanent decline (Korowicz 2010; Hirsch, Bezdek, and Wendling 2005; Ruppert 2009). Therefore, in addition to making the wrong assumptions about atmospheric GHG concentration and global temperature targets, the international community is assuming that anything resembling business as usual is actually possible. Given that some levels of government are already aware of peak oil (e.g., the U.S. and UK) (Auzanneau 2010; Macalister 2009, 2010; U.S. JFC 2010; ITPOES 2010; Ruppert 2009; Hirsch, Bezdek, and Wendling 2005), it may be possible that some of the paltry Accord pledges and resistance to develop a progressive climate policy may reflect insider knowledge that energy supplies, and hence GHG emissions, will indeed decline in the near-term. In which case, the climate negotiations may merely be a symbolic activity by some actors in order to maintain an illusion of economic and political stability.

With peak oil, there is a high probability that our integrated and globalized civilization is on the verge of a rapid and near-term collapse. Once peak oil production causes the collapse of the global economy and

threatens the lives and livelihoods of countless billions of people (Hirsch, Bezdek, and Wendling 2005; Korowicz 2010; Ruppert 2009), it is possible that climate negotiations may be abandoned or at least marginalized for a long time (if not permanently) as the crisis of peak oil overwhelms the stability and security of every nation. In this context, the greatest threat to having successful and meaningful climate negotiations may not be the self-interested motivations and political impasse of the international community, but rather the possible panic and lack of political will that will likely ensue once peak oil shock takes effect. In this case, it will likely require a concerted and transcendent effort on the part of any remaining international climate negotiators, their governments, and the public to pursue a meaningful international climate policy – much less a binding international climate treaty. Two main arguments against pursuing an international climate policy will likely be made: (1) the peak oil shock and the associated collapse of societies will be a more pressing issue; and (2) climate change will no longer be a concern since most oil demand will have been destroyed which will cause GHG emissions to decline sharply.

Unfortunately, the rhetoric of these arguments may be accepted to the detriment of future climate negotiations and global society. Regarding the first argument: Although the peak oil crisis will become a very important short- and medium-term priority, climate change will continue to affect every part of the world in the short- to long-term. As resources become scarce due to fuel scarcity, economic depression, and societal collapse, climate change will continue to threaten water, food, and ecosystem security throughout the world. With scarce energy supplies and economic resources, capacity building and humanitarian relief will be limited or unavailable.

Regarding the second argument: Even though GHG emissions will likely decline substantially after the peak oil shock, they will not cease entirely. Some oil will be consumed by the institutions (e.g., military, basic services, etc.) and people who can afford and secure the remaining expensive oil supplies. In addition, coal, natural gas, and other hydrocarbon fuels will continue to be used as an energy source – albeit on a more limited scale – until the production of those resources peak in the coming decades. Furthermore, land use and deforestation caused by human activities and climate change will likely continue to contribute to GHG emissions.

Therefore, it is clear that the international climate negotiations and any potential climate policy thus far are based on very serious and erroneous assumptions about the physical constraints of the planet Earth, its resources, and carrying capacity:

1. proposed targets for atmospheric GHG concentrations and global temperature rise are much too high to prevent catastrophic climate change;

2. the intentions and commitments of the international community are woefully insufficient to seriously mitigate dangerous anthropogenic climate change;

3. the competing and conflicting economic and social agendas of most nations are in complete conflict with the supportive capacity of a stable climate system – and ultimately their own national interests;

4. the international community is making the calamitous assumption that there is enough global oil supply to continue fueling their various agendas for unlimited economic growth and development (i.e., business as usual), and that this presumed unlimited oil supply will contribute to future GHG

emissions.

Clearly, the international community and climate negotiators urgently need to review and reconsider the science and data regarding climate change and energy supplies. Then, they need to have a truly honest discussion on how to *realistically* manage the two impending and unprecedented crises confronting the world. If this reassessment and discourse does not occur, not only will the international climate negotiations be ineffective, if not entirely destined to failure, human security and the stability of every society will be gravely threatened by these systemic crises.

Copenhagen Accord Commitments

At its fifteenth session, the Conference of the Parties (COP) took note of the Copenhagen Accord of 18 December 2009 by way of decision 2/CP.15 (UNFCCC 2010).

The chapeau of the Copenhagen Accord lists the following Parties agreeing to the Accord (UNFCCC 2010) (some of the listed Parties stated in their communications to the secretariat specific understandings on the nature of the Accord and related matters, based on which they have agreed to be listed):

Albania, Algeria, Armenia, Australia, Austria, Bahamas, Bangladesh, Belarus, Belgium, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Cambodia, Canada, Central African Republic, Chile, China, Colombia, Congo, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Democratic Republic of Congo, Denmark, Djibouti, Eritrea, Estonia, Ethiopia, European Union, Fiji, Finland, France, Gabon, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kiribati, Lao People's Democratic Republic, Latvia, Lesotho, Liechtenstein, Lithuania, Luxemburg, Madagascar, Malawi, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mexico, Monaco, Mongolia, Montenegro, Morocco, Namibia, Nepal, Netherlands, New Zealand, Norway, Palau, Panama, Papua New Guinea, Peru, Poland, Portugal, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Rwanda, Samoa, San Marino, Senegal, Serbia, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Swaziland, Switzerland, The Former Yugoslav Republic of Macedonia, Tonga, Trinidad and Tobago, Tunisia, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Zambia.

Since the issuance of the report of the COP on its fifteenth session, the secretariat has received communications from the following Parties expressing their intention to be listed as agreeing to the Accord (UNFCCC 2010):

Afghanistan, Chad, Gambia, Jamaica, Viet Nam.

Table 1 shows the national plans (emissions cuts by 2020 from 1990 levels unless otherwise stated) (Doyle 2010):

Table 1: National Plans (Doyle, 2010)	
Industrialized Nations	**National Plan**
Australia	5% below 2000 levels, 25% if there is an ambitious global deal. The range is 3–23% below 1990
Belarus	5 to 10%, on condition of access to carbon trading and new technologies
Canada	17% from 2005 levels, matching U.S. goal
Croatia	5%
EU (27 nations)	20%, or 30% if others act
Iceland	30% in a joint effort with the EU
Japan	25% as part of a "fair and effective international framework"
Kazakhstan	15%
Liechtenstein	20%, or 30% if others act
Monaco	30%; aims to be carbon neutral by 2050
New Zealand	10 to 20% "if there is a comprehensive global agreement"
Norway	30%, or 40 if there is an ambitious deal
Russia	15 to 25%
Switzerland	20%, or 30% if other developed nations make comparable cuts and poor nations act
United States	17% from 2005 levels, or 4% from 1990 levels

Developing Nations	**National Action Pledges for 2020**
Brazil	Aims to cut emissions by between 36.1 and 38.9% below "business as usual" levels with measures such as reducing deforestation, energy efficiency and more hydropower
China	Aims to cut the amount of carbon produced per unit of economic output by 40 to 45% from 2005 levels. This "carbon intensity" goal would let emissions keep rising, but more slowly than economic growth
India	Aims to reduce the emissions intensity of gross domestic product by 20 to 25% from 2005 levels
Indonesia	Aims to reduce emissions by 26% by 2020 with measures including sustainable peat management, reduced deforestation, and energy efficiency
Mexico	Aims to cut greenhouse gases by up to 30% below "business as usual". A climate change programme from 2009–12 will also avert 51 million tonnes of carbon emissions
South Africa	With the right international aid, South Africa says its emissions could peak between 2020–25, plateau for a decade and then decline in absolute terms from about 2035

South Korea	Aims to cut greenhouse gas emissions by 30% below "business as usual" projections

Other Nations	National Pledges
Armenia	Increase renewable energy output, modernize power plants, restore forests
Benin	Develop public transport in Cotonou, better forest management, methane recovery from waste in big cities
Bhutan	Already absorbs more carbon in vegetation than it emits from burning fossil fuels; plans to stay that way
Botswana	Shift to gas from coal. Nuclear power, renewables, biomass and carbon capture also among options
Congo	Improve agriculture, limit vehicles in major cities, better forestry management
Costa Rica	A long–term effort to become "carbon neutral" under which any industrial emissions will be offset elsewhere, for instance by planting forests
Ethiopia	More hydropower dams, wind farms, geothermal energy, biofuels and reforestation
Eritrea	Improve energy conservation, efficiency, reduce deforestation, enhance soil carbon stocks
Gabon	Increase forestry, bolster clean energy
Georgia	Try to build a low–carbon economy while ensuring continued growth
Ghana	Switch from oil to natural gas in electricity generation, build more hydropower dams, raise the share of renewable energy to 10–20% of electricity by 2020
Israel	Strive for a 20% cut in emissions below "business as usual" projections. Goals include getting 10% of electricity generation from renewable sources
Ivory Coast	Shift to renewable energies, better forest management and farming, improved pollution monitoring
Jordan	Shift to renewable energies, upgrade railways, roads and ports. Goals include modernising military equipment
Macedonia	Improve energy efficiency, boost renewable energies, harmonise with EU energy laws
Madagascar	Shift to hydropower for major cities, push for "large scale" reforestation across the island, improve agriculture, waste management and transport
Maldives	Achieve "carbon neutrality" by 2020
Marshall Islands	Cut carbon dioxide emissions by 40% below 2009 levels
Mauritania	Raise forest cover to 9% by 2050 from 3.2% in 2009, boost clean energy
Moldova	Cut emissions by "no less than 25 percent" from 1990 levels
Mongolia	Examining large-scale solar power in the Gobi desert, wind and hydropower. Improve use of coal

Morocco	Develop renewable energies such as wind, solar power, hydropower. Improve industrial efficiency
Papua New Guinea	At least halve emissions per unit of economic output by 2030; become carbon neutral by 2050
Sierra Leone	Set up a National Secretariat for Climate Change, create 12 protected areas by 2015, protect forests. Increase conservation efforts, ensure forest cover of at least 3.4 million hectares by 2015. Develop clean energy including biofuels from sugarcane or rice husks
Singapore	Reduce greenhouse gas emissions by 16% below "business as usual" levels if the world agrees a strong, legally binding deal
Togo	Raise forested area to 30% of the country by 2050 from 7% in 2005; improve energy efficiency

Table 2 offers a more comprehensive analysis of the publicly reported proposals to UNFCCC's COP-15, as interpreted by the Sustainability Institute (Siegel 2010). The following table does not include all of the developing nations listed in Table 1. Regular text indicates a “confirmed proposal”; italic text in parentheses indicates a “potential proposal”. Confirmed proposals include official government statements, adopted legislation, and UNFCCC submissions. Potential proposals include conditional proposals, legislation under consideration, and unofficial government statements.

Table 2: Publicly Reported Proposals to UNFCCC's COP-15
(Siegel, 2010)

	Reduction in Emissions		
Country/Region	**2020**	**2050**	**Other Proposals**
Argentina			*(Zero deforestation by 2020)*
Australia	5% below 2000 *(25% below 2000)*	60% below 2000	20% renewable energy by 2020
Belarus	*(10% below 1990)*		
Brazil	36.1% below BAU *(38.9% below BAU)*		Amazon deforestation rate 70% below 2009 levels by 2017 *(Zero deforestation by 2020)*
Canada	17% below 2005	60% below 2006 *(70% below 2006)*	
China	carbon intensity 45% below 2005		Increase forest coverage by 40 million hectares by 2020; increase proportion of non-fossil fuels to 15% by 2020 *(Emissions peak in 2030 and fall to 2005 levels by 2050)*
Costa Rica			Zero emissions by 2021

Croatia	5% below 1990		
EU-27	20% below 1990 *(30% below 1990)*	80% below 1990 *(95% below 1990)*	
Finland*		80% below 1990	
Germany*	40% below 1990		
Great Britain	34% below 1990	80% below 1990	
Iceland	15% below 1990 *(30% below 1990)*	50% below 1990 *(75% below 1990)*	
India	carbon intensity 20% below 2005		Keep emissions per capita below those of developed countries *(20% of electricity from renewable energy by 2020)*
Indonesia	26% below BAU		*(40% below 2005 by 2030; Change forest to net sink by 2030)*
Israel	20% below BAU		
Japan	*(25% below 1990)*	*(80% below 2005)*	
Jordan			10% renewable energy by 2020
Kazakhstan	15% of 1992		
Liechtenstein	20% below 1990 *(30% below 1990)*		
Malaysia	carbon intensity 40% below 2005		
Maldives	carbon neutral		
Marshall Islands	*(40% below 2009)*		
Mexico	*(30% below BAU)*	*(50% below 2002)*	8% below 2009 by 2012
Moldova	25% below 1990		
Monaco	30% below 1990	carbon neutral	
Morocco			600% increase in wind power and 15% reduction in building, industry, and transport energy use by 2020
New Zealand	*(20% below 1990)*	50% below 1990	
Norway	30% below 1990 *(40% below 1990)*		*(carbon neutral by 2030)*
Papua New Guinea		*(carbon neutral)*	*(50% below BAU by 2030)*
Paraguay			*(Zero deforestation by 2020)*
Russia	15% below 1990 *(25% below 1990)*	50% below 1990	
Scotland*	42% below 1990	80% below 1990	

Singapore	*(16% below BAU)*		
South Africa	*(34% below BAU)*		Emissions peak in 2025, stabilize for 10 years and decline *(42% below BAU by 2025)*
South Korea	30% below BAU		
Switzerland	20% below 1990 *(30% below 1990)*		*(carbon neutral by 2030)*
Ukraine	*(20% below 1990)*	*(50% below 1990)*	
United States	17% below 2005 *(28% below 2005)*	*(75% below 2005)*	

* Countries are part of the EU-27

Carbon intensity refers to GHG emissions per unit GDP.

Inaccurate Analyses

Target GHG Concentration and Temperature

The Copenhagen Accord calls for "deep cuts in global emissions...with a view to reduce global emissions so as to hold the increase in global temperature below 2 degrees Celsius." However, ***greenhouse gas (GHG) emissions reduction pledges submitted to the UNFCCC as part of the Copenhagen Accord process are insufficient to limit temperature increase to 2°C relative to pre-industrial global mean temperatures.***

Only a few reports have analyzed the emissions reductions goals expressed by various nations in their submissions to UNFCCC as part of process laid out in the Copenhagen Accord (DB 2010; Houser 2010b, 2010a; Light 2010; Project Catalyst 2010; Sawin et al. 2009). However, ***all of these analyses make an incorrect assumption that a target atmospheric GHG concentration of about 450 ppm CO_2e would more or less guarantee that global average temperature rise would be limited to 2°C.*** Why a target atmospheric GHG concentration of about 450 ppm CO_2e will likely not limit a global average temperature rise less than 2°C will be discussed in the following section.

Among them, Project Catalyst (2010) recently released a report claiming that achieving these GHG emissions reduction commitments could result in a 3°C (attributed to an atmospheric GHG concentration of 550 ppm CO_2e) increase rather than a 4.8°C degree increase by 2100 under a business as usual scenario. The analysis is based on assuming that global GHG emissions should be no greater than 44 gigatons (Gt) per year CO_2e by 2020. Based on their modeling and analysis of the high-end abatement and low-end abatement emissions reductions pledges, these commitments would be approximately 5 and 9 Gt CO_2e per year less (high- and low-end respectively) than the reductions needed to stabilize temperature increase at 2°C over pre-industrial levels (assuming an atmospheric GHG concentration target of 450 ppm CO_2e), assuming that nations successfully meet their emissions reduction commitments, and also that commitments tied to other nations' comparable efforts go forward (Project Catalyst 2010). Unfortunately, the Project Catalyst report is not transparent in the methodology of its modeling and analysis, which prevents a full assessment of the accuracy of its analysis. However, its estimates are comparable to the other reports that analyze the Accord's emissions reductions pledges. Moreover, the Project Catalyst analysis is inaccurate due to its assumption that global mean temperature can stabilize at 2°C at an atmospheric GHG concentration of 450 ppm CO_2e – an atmospheric GHG concentration of 450 ppm CO_2e is likely too high to stabilize global warming at 2°C.

The Climate Action Tracker is a science-based assessment of Climate Analytics, Ecofys, and the Potsdam Institute for Climate Impact Research (PIK) that regularly provides updated information on nations' GHG reduction proposals. According to Climate Action Tracker, pledges under the Copenhagen Accord will put the world on a pathway of 3.2 – 3.5°C by 2100. There is a gap of 4 – 8 Gt between the projected emission reductions in 2020 and what is required to achieve a 2°C pathway. In a high-end abatement scenario, emission reductions by developed countries will amount to 0.8 – 2.2 Gt below BAU (business as usual) by 2020 (or 11 – 19% below 1990 levels); and developing countries will reduce emissions between 0.8 – 3.2 Gt below BAU by 2020 (Climate Action Tracker 2010b, 2010a). However, the Climate Action Tracker

does not explicitly state what is the atmospheric GHG emissions concentration (e.g., 450 ppm CO_2, 550 ppm CO_2e) used to make these temperature projections. Based on the number values and citations published by Climate Action Tracker, its projections to not exceed an average global temperature increase of 2°C appear based on an atmospheric GHG concentration target of 450 ppm CO_2e (Climate Action Tracker 2010b, 2010c; Joeri Rogelj et al. 2010).

An analysis by Trevor Houser (2010b) claims that the Copenhagen Accord pledges will reduce emissions 7 – 13% below BAU in 2020. Pledges by developed countries will reduce emissions 10 – 13% below BAU in 2020; and developing countries pledge to reduce emissions 6 – 9% below BAU. According to Houser's analysis, if these pledges are achieved, atmospheric GHG concentrations should peak at 487 – 490 ppm CO_2e by 2020. Depending on the model considered in the author's analysis, this peak in GHG concentrations could lead to and average global temperature increase of 1.3 – 2.4°C – assuming that after 2020, no nation is required to reduce emissions at an annual rate greater than would be required of the United States under the House of Representatives-passed American Clean Energy and Security Act, or to reduce per capita emissions below that of the European Union assuming the EU achieves its target of reducing emissions by 80% below 1990 levels by 2050. Like the the previous analyses, Houser's analysis also assumes that global mean temperature can stabilize at approximately 2°C at an atmospheric GHG concentration of approximately 450 ppm CO_2e; in this case, with a peak at around 487 – 490 ppm CO_2e by 2020.

The Climate Interactive team of researchers from the Sustainability Institute, the MIT Sloan School of Management, and Ventana Systems analyzed the GHG emissions reduction pledges submitted to the UNFCCC as part of the Copenhagen Accord process. The researchers analyzed the reduction proposals submitted through 2 February 2010 using the C-ROADS (Climate Rapid Overview and Decision-support Simulator) computer simulation of climate change; which assumes that the targets for emissions reductions pledged by nations in their submissions are fully achieved and that loopholes (e.g., double counting of offsets) do not occur (Fiddaman et al. 2009). A version of C-ROADS is being used by individuals participating in or monitoring the UNFCCC negotiations in order to allow for the rapid summation of national greenhouse gas reduction pledges in order to show the long-term impact on the climate.

The C-ROADS analysis of the low-end abatement emissions reductions pledges (referred to as "Confirmed Proposals" in the analysis) claims that the confirmed emissions reduction proposals submitted to the UNFCCC, if fully implemented, would allow the global mean temperature to increase by approximately 3.9°C above pre-industrial levels (attributed to an atmospheric GHG concentration of 1015 ppm CO_2e and 770 ppm CO_2) rather than a 4.8°C degree increase by 2100 under a business as usual scenario (1410 ppm CO_2e and 965 ppm CO_2) (Siegel 2010; Sustainability Institute 2010).

According to this analysis of the "Confirmed Proposals", in order to reach the Copenhagen Accord goal of less than 2°C, global GHG emissions must peak by 2020 and then fall to at least 50% below 1990 levels by 2050 (Siegel 2010; Sustainability Institute 2010). These commitments would be approximately 10 Gt CO_2e per year less than the reductions needed to stabilize atmospheric GHG concentrations to 450 ppm CO_2e (44 Gt CO_2e per year). Under the current emissions reduction proposals, global GHG emissions would increase on average 0.8% per year between 2010 – 2020. After 2020, emissions would need to fall at a rate of at least approximately 3.3% per year to achieve the target of reducing GHG emissions 50% below 1990 levels by 2050 (Sustainability Institute 2010).

The high-end abatement emissions reductions pledges from the potential emissions reduction proposals submitted to the UNFCCC ("Potential Proposals") also would not meet the 2°C target. If fully implemented, the potential emissions pledges would allow the global mean temperature to increase by approximately 2.9°C above pre-industrial levels (715 ppm CO_2e and 585 ppm CO_2) by 2100 (Siegel 2010), assuming that nations successfully meet their emissions reduction commitments, and also that commitments tied to other nations' comparable efforts go forward. These commitments would be approximately 5 Gt CO_2e per year less than the reductions needed to stabilize atmospheric GHG concentrations to 450 ppm CO_2e (44 Gt CO_2e per year).

In order to stabilize global mean temperature at less than 2°C, the C-ROADS analysis suggests a "Low Emissions Path" that would aim for an atmospheric GHG concentration of approximately 470 ppm CO_2 (520 ppm CO_2e) (see Tables 4 – 6). Similar to the Project Catalyst analysis, this low emissions scenario requires that global GHG emissions be no greater than approximately 48 Gt per year CO_2e by 2020, and no more than 20 Gt CO_2e per year by 2050. These commitments would be approximately 4 Gt CO_2e per year less than the reductions needed to stabilize atmospheric GHG concentrations to 450 ppm CO_2e (44 Gt CO_2e per year). However, the entire C-ROADS analysis is also based on the assumption that global mean temperature can stabilize at 2°C (1.2° – 3.1°C) at an atmospheric GHG concentration of approximately 470 ppm CO_2 (520 ppm CO_2e) (Siegel 2010); which is also too high to stabilize at 2°C as discussed in the following paragraph.

Energy Supplies, Economic Growth, and Development

In addition to erroneous assumptions about the constraints of the climate system, there is also one other ultra-critical assumption that the scientific and international community, and the climate negotiators are making: ***Economic and emissions projections generally assume that there is an unlimited or nigh-limitless supply of oil and other fossil fuels to fuel unlimited economic growth and development*** (Höök, Sivertsson, and Aleklett 2010). ***Given that global peak oil production likely occurred in 2008 or by 2011 (with global oil supply shortages predicted by 2011 – 2015) and that global demand for oil is growing rapidly (Macalister 2010, 2009; U.S. JFC 2010; Auzanneau 2010; ITPOES 2010; Ruppert 2009), it is probable that business as usual (unlimited economic growth, environmental degradation, and GHG emissions) beyond the next few years will be impossible as the global oil-based economy enters a rapid and permanent decline*** (Korowicz 2010; Hirsch, Bezdek, and Wendling 2005; Ruppert 2009). Therefore, ***in addition to making the wrong assumptions about atmospheric GHG concentration and global temperature targets, the international community is assuming that anything resembling business as usual is actually possible.*** Given that some levels of government are already aware of peak oil (e.g., the U.S. and UK) (Auzanneau 2010; Macalister 2009, 2010; U.S. JFC 2010; ITPOES 2010; Ruppert 2009; Hirsch, Bezdek, and Wendling 2005), it may be possible that some of the paltry Accord pledges and resistance to develop a progressive climate policy may reflect insider knowledge that energy supplies, and hence GHG emissions, will indeed decline in the near-term. In which case, the climate negotiations may merely be a symbolic activity by some actors in order to maintain an illusion of economic and political stability.

With peak oil, there is a high probability that our integrated and globalized civilization is on the verge of a rapid and near-term collapse. Once peak oil production causes the collapse of the global economy and threatens the lives and livelihoods of countless billions of people (Hirsch, Bezdek, and Wendling 2005; Korowicz 2010; Ruppert 2009), ***it is possible that climate negotiations may be abandoned or at least marginalized for a long time (if not permanently) as the crisis of peak oil overwhelms the stability and***

security of every nation. In this context, the greatest threat to having successful and meaningful climate negotiations may not be the self-interested motivations and political impasse of the international community, but rather the possible panic and lack of political will that will likely ensue once peak oil shock takes effect. In this case, ***it will likely require a concerted and transcendent effort on the part of any remaining international climate negotiators, their governments, and the public to pursue a meaningful international climate policy – much less a binding international climate treaty.*** Two main arguments against pursuing an international climate policy will likely be made: (1) the peak oil shock and the associated collapse of societies will be a more pressing issue; and (2) climate change will no longer be a concern since most oil demand will have been destroyed which will cause GHG emissions to decline sharply.

Unfortunately, the rhetoric of these arguments may be accepted to the detriment of future climate negotiations and global society. Regarding the first argument: Although the peak oil crisis will become a very important short- and medium-term priority, climate change will continue to affect every part of the world in the short- to long-term. As resources become scarce due to fuel scarcity, economic depression, and societal collapse, climate change will continue to threaten water, food, and ecosystem security throughout the world. With scarce energy supplies and economic resources, capacity building and humanitarian relief will be limited or unavailable.

Regarding the second argument: Even though GHG emissions will likely decline substantially after the peak oil shock, they will not cease entirely. Some oil will be consumed by the institutions (e.g., military, basic services, etc.) and people who can afford and secure the remaining expensive oil supplies. In addition, coal, natural gas, and other hydrocarbon fuels will continue to be used as an energy source – albeit on a more limited scale – until the production of those resources peak in the coming decades. Furthermore, land use and deforestation caused by human activities and climate change will likely continue to contribute to GHG emissions.

Therefore, it is clear that the international climate negotiations and any potential climate policy thus far are based on very serious and erroneous assumptions about the physical constraints of the planet Earth, its resources, and carrying capacity:

1. proposed targets for atmospheric GHG concentrations and global temperature rise are much too high to prevent catastrophic climate change;

2. the intentions and commitments of the international community are woefully insufficient to seriously mitigate dangerous anthropogenic climate change;

3. the competing and conflicting economic and social agendas of most nations are in complete conflict with the supportive capacity of a stable climate system – and ultimately their own national interests; and

4. the international community is making the calamitous assumption that there is enough global oil supply to continue fueling their various agendas for unlimited economic growth and development (i.e., business as usual), and that this presumed unlimited oil supply will contribute to future GHG emissions.

Clearly, ***the international community and climate negotiators urgently need to review and reconsider the***

science and data regarding climate change and energy supplies. Then, they need to have a truly honest discussion on how to *realistically* manage the two impending and unprecedented crises confronting the world. If this reassessment and discourse does not occur, not only will the international climate negotiations be ineffective, if not entirely destined to failure, human security and the stability of every society will be gravely threatened by these systemic crises.

A New Analysis Using More Accurate Assumptions

Assessing Peak Oil

It is beyond the scope of this report to project GHG emissions trends after peak oil has occurred, in part because it may be impossible to generate emissions data sets from a collapsing global economy. Regardless of any government policies, ***GHG emissions from fossil fuel burning, cement manufacture, and land use are likely to experience a significant collapse as production and the operational infrastructure falls apart***. Furthermore, exploiting most emissions-intensive sources of oil (e.g., tar sands, low grade oil) will likely to become impractical as demand collapses, and the purchasing power of consumers declines below the marginal cost of production and the energy infrastructure is lost to entropic decay (Korowicz 2010). Nevertheless, ***coal, natural gas, and other hydrocarbon fuel sources may continue to be exploited, albeit at an uncertain rate.***

Land-use emissions may see various counteracting trends. A decline in global trade may result in a decline in GHG emissions from fertilizers and agriculture, and from reduced pressure on forests and other ecosystems for material resources for the global economy. However, an increase in demand for agricultural land for food and biofuels might increase. Although global and even regional trade may collapse, localized industry, land use and deforestation may occur as people respond to immediate shortages.

Nevertheless, ***the lag time in the climate system (i.e., climate inertia) will likely cause global temperatures to rise, even with a collapse in emissions.*** Since we do not know how close we are to crossing climate tipping points and strong climate feedbacks, the climate system could continue to drive increasing total GHG emissions even though anthropogenic emissions may decline. Therefore, climate change will likely progress (increase or decline), which will have uncertain impacts on every population in every region of the world.

Target GHG Concentration and Temperature

Regardless of peak oil and its impacts on human activities and GHG emissions, it is urgently important to evaluate target atmospheric GHG concentrations and temperature increases using proper assumptions based on the correct science and data. As the above analyses demonstrate, ***a common assumption in setting goals to hold the increase in global mean temperature below 2°C relative to pre-industrial global mean temperatures is that the target atmospheric GHG concentration should not exceed 450 ppm CO_2 – or less often, 450 ppm CO_2e (400 ppm CO_2)***. As mentioned in the previous paragraphs, the reports assessed in this report base their analyses on this 450 ppm CO_2e target. However, ***the IPCC claims that a concentration of 450 ppm CO_2e (400 ppm CO_2) would only provide approximately a 50% chance (within a probability distribution of 26 – 78%) of remaining below a dangerous global average temperature rise of***

2.1°C above pre-industrial global average temperature with a "likely in the range" of 1.4 – 3.1°C rise (IPCC 2007b). In order to stabilize atmospheric concentrations of greenhouse gases to 450 ppm CO_2e, the IPCC climate models indicate that developed countries need to reduce emissions to 25 – 40% below 1990 levels by 2020, and 80 – 95% below 1990 levels by 2050 (IPCC 2007a).

However, caution should be used when interpreting the 2007 IPCC report findings since they tended to ignore various critical climate forcing mechanisms (e.g. Arctic and Greenland ice sheet melt), assumed linear responses in the climate system, and inadequately consider non-linear climate responses (i.e., abrupt climate change) (IPCC 2007b). Consequently, ***the 2007 IPCC estimates are considered very conservative, in part, because they under-estimate climate sensitivity, climate forcing mechanisms, and feedback cycles.***

In December 2008, the Copenhagen Climate Science Congress concluded "the worst-case IPCC scenario trajectories (or even worse) are being realized (University of Copenhagen Climate Office 2009)". Additionally, the 2007 IPCC report did not include the many new scientific findings published after its release. Therefore, these concerns about the findings and recommendations of the 2007 IPCC report suggest that ***the recommended 450 ppm CO_2e stabilization target should be accepted as an upper limit – but not necessarily a safe limit – to atmospheric GHG concentrations***.

The climate system may have already passed the 2°C threshold. Given that as of 2005, when atmospheric CO_2 concentrations were already about 380 ppm (~422 ppm CO_2e), ***GHG emissions may have committed the planet to a warming of 2.4ºC (within a range of 1.4º – 4.3ºC) above the pre-industrial surface temperatures*** (Ramanathan and Feng 2008). Based on an estimated history of CO_2 through the Cenozoic Era (the period from 65.5 million years ago to the present), Hansen et al. (2008) suggest that ***a CO_2 concentration of order 450 ppm or greater, if long maintained, would push the Earth toward an ice-free state and that "such a CO_2 level likely would cause the passing of climate tipping points and initiate dynamic responses that could be out of humanity's control"***. Nevertheless, Hansen and other climate scientists believe that humanity has already passed the threshold for "dangerous anthropogenic interference" with the natural climate system (Hansen et al. 2008). Ramanathan and Feng (2008) project that ***as CO_2 concentrations approach 441 ppm a corresponding committed warming of 3.1ºC will occur by 2030 in the absence of strong countervailing mitigation***.

Achieving a 2°C target with at least a likely chance (>66%) would require a long-term stabilization below 400ppm CO_2e (350 ppm CO_2) (Moss et al. 2008). At 400 ppm CO_2e, the mean probability of exceeding 2°C is 28% (Meinshausen 2006). ***A target of stabilizing greenhouse gas emissions at 350 ppm CO_2e (approximately 300 ppm CO_2) would reduce the mean probability of exceeding a 2°C temperature rise to 7%*** (Meinshausen 2006). Therefore, a target atmospheric concentration of GHGs of no greater than 400 ppm CO_2e will likely be needed to prevent the world from passing climate tipping points. However, ***a target concentration of 350 ppm CO_2e (300 ppm CO_2) may be needed to ensure that the climate does not pass the 2ºC threshold***.

Although the assumed 450 ppm CO_2e target for atmospheric GHG concentrations of the "Low Emissions Path" scenario is too high, the C-ROADS analysis includes a scenario, "Global 80% Reduction", that assesses the Copenhagen Accord reduction proposals to the UNFCCC at limiting atmospheric CO_2e concentrations to approximately 400 ppm CO_2e by 2020. The "Global 80% Reduction" scenario projects that atmospheric GHG concentrations will be approximately 413 ppm CO_2e by 2020, and 408 ppm CO_2e by 2050 through 2100 (see Tables 4 – 6). The projections of this scenario are based on an 80% reduction of 2005 fossil fuel CO_2 levels by 2050 for all countries, where CO_2 changes apply to CO_2-equivalent

emissions. The projections also assume an 80% decrease in deforestation from 2005 levels by 2050, and an afforestation increase to 80% of the maximum potential by 2050. Global emissions of methane, nitrous oxide, PFCs, SF6, and HFCs follow a path to achieve specified CO_2-equivalent emissions changes. CFCs and other ozone depleting substances follow the Montreal Protocol for emissions reductions (Siegel 2010).

According to the analysis for "Global 80% Reduction", global GHG emissions should be no greater than approximately 30 Gt per year CO_2e by 2020, and no more than 3 Gt CO_2e per year by 2050 through 2100. Based on the C-ROADS modeling and analysis of the GHG emissions reduction pledges submitted to the UNFCCC as part of the Copenhagen Accord process, the low-end abatement pledges ("Confirmed Proposals") would be about 24 Gt CO_2e per year less than the reductions needed to stabilize temperature increase at 2°C over pre-industrial levels (30 Gt per year CO_2e by 2020). The high-end abatement pledges ("Potential Proposals") would be about 20 Gt CO_2e per year less than necessary. And, the "Low Emissions Path" recommended by the C-ROADS analysis would be about 18 Gt CO_2e per year less than required. By 2050, the gap between "Confirmed Proposals" and "Potential Proposals" versus "Global 80% Reductions" would be about 79 Gt CO_2e and 44 Gt Co2e, respectively. By 2100, the gap between "Confirmed Proposals" and "Potential Proposals" versus "Global 80% Reductions" would be about 96 Gt CO_2e and 51 Gt Co2e, respectively (Siegel 2010).

Therefore, in order to have at least a likely chance (>66%) to limit global mean temperature increase to less than 2°C, the Copenhagen Accord proposals would require a long-term stabilization at approximately 400ppm CO_2e, which would require that global GHG emissions be no greater than approximately 30 Gt per year CO_2e by 2020, and no more than 3 Gt CO_2e per year by 2050 through 2100. ***The "Confirmed Proposals" and "Potential Proposals" are 24 and 20 Gt CO_2e per year less than necessary, respectively.***

In the following tables (Siegel 2010), Table 4 shows projected GHG emissions trends for the different C-ROADS scenarios discussed in this report; and Tables 5 and 6 show projected atmospheric GHG concentrations for the different C-ROADS scenarios discussed in this report:

Table 4: Global CO_2e Emissions Trends Under C-ROADS Scenarios
(Siegel, 2010)

	Global CO_2e Emissions			
	Gt CO_2e per year			
Scenario	**2009**	**2020**	**2050**	**2100**
BAU	49.28	61.87	115.58	146.52
Confirmed Proposals	49.28	53.92	81.72	99.00
Potential Proposals	49.28	49.93	46.86	53.64
Low Emissions Path	49.28	47.72	20.21	20.81
Global 80% Reductions	49.28	30.56	2.83	2.18

Table 5: Atmospheric CO_2e Concentration Trends Under C-ROADS Scenarios
(Siegel, 2010)

Scenario	Atmospheric CO_2e Concentration parts per million (ppm)			
	2009	**2020**	**2050**	**2100**
BAU	397.92	438.17	682.26	1409.98
Confirmed Proposals	397.92	432.22	597.51	1014.88
Potential Proposals	397.92	429.24	531.04	716.78
Low Emissions Path	397.92	429.31	460.99	518.48
Global 80% Reductions	397.92	413.02	407.57	407.64

Table 6: Atmospheric CO_2 Concentration Trends Under C-ROADS Scenarios
(Siegel, 2010)

	Atmospheric CO_2 Concentration parts per million (ppm)			
	2009	**2020**	**2050**	**2100**
BAU	389.42	417.47	558.19	965.42
Confirmed Proposals	389.42	414.17	514.98	771.84
Potential Proposals	389.42	412.46	473.99	583.60
Low Emissions Path	389.42	412.87	438.07	469.75
Global 80% Reductions	389.42	403.93	399.15	380.09

The Copenhagen 5 (C-5)

The Emergence of a Negotiating Bloc

The emergence of a recent negotiating bloc – the so-called Copenhagen 5 (C-5) – during the COP-15 in Copenhagen has changed the dynamics of climate geopolitics. The C-5 consists of the U.S. and the BASIC group of nations (Brazil, South Africa, India and China). The leadership by the so-called Copenhagen 5 (C-5), who represent approximately 45% of the global population and about 44% of global GHG emissions (CAIT 2010), form a new geopolitical alliance and reflects a transition to a new geopolitical order in climate negotiations. The C-5 has begun to sideline the European Union's more traditional leadership role in international climate negotiations, and has given cause for concern for developing nations who feel that the larger economies represented by the C-5 may try to dominate the UNFCCC process and the international climate, energy, and economic agenda.

BASIC

Emerging Bloc of the South

The BASIC group of nations (Brazil, South Africa, India and China) represent approximately 28% of the world's GHG emissions (China – 16.36%, Brazil – 6.47%, India – 4.25%, South Africa – 0.98%) (CAIT 2010). In a joint statement of the BASIC group of nations, the bloc stated that

"BASIC is not just a forum for negotiation coordination, but also a forum for cooperative actions on mitigation and adaptation including exchange of information and collaboration in matters relating to climate science & [sic] climate-related technologies. The Ministers expressed their desire to enhance South-South cooperation with other countries on various issues including those relating to scientific cooperation and support for adaptation to vulnerable countries (BASIC 2010a)."

The BASIC group has emphasized that the Copenhagen Accord has no legal basis. India's environment minister, Jairam Ramesh said, "We support the Copenhagen Accord. But all of us were unanimously of the view that its value lies not as a standalone document but as an input into the two-track negotiation process under the United Nations Framework Convention on Climate Change (UNFCCC) (Devraj 2010)." At the third meeting of BASIC ministers on 25 April 2010, the ministers noted that internationally binding legal agreements already exist in the UNFCCC and its Kyoto Protocol (BASIC 2010b).

The reluctance of some nations to associate with the Copenhagen Accord after the COP-15 was in part an attempt to ensure that the Accord did not take on a legal or procedural status beyond what was intended. Many nations clearly noted in their submissions to the UNFCCC Secretariat that they were not satisfied with the Accord's content and the manner in which it was concluded. Many nations, including the BASIC group, also wanted to ensure that the Accord was not used to start a legal or procedural process that might replace or run in parallel to the UNFCCC process. The BASIC group holds that the UNFCCC process is

central, and that in accordance with the mandate of the Bali Road Map they intend to continue the negotiations on the two tracks of Ad hoc Working Group on Long-term Cooperative Action (AWG-LCA) under the Convention and the Ad hoc Working Group on further emission reduction commitments for Annex I Parties under the Kyoto Protocol (AWG-Kyoto Protocol) in 2010 leading up to COP-16 and COP/MOP6 at Mexico (BASIC 2010a, 2010b). The BASIC ministers emphasized that "all negotiations must be conducted in an inclusive and transparent manner (BASIC 2010a)."

Furthermore, the BASIC group insists that such climate agreements must include an agreement on quantified emission reduction targets under a second commitment period for Annex I Parties under the Kyoto Protocol, and a legally binding agreement on long-term cooperative action under the Convention (BASIC 2010b). Without binding emissions reductions for the developed nations, the BASIC bloc is reluctant to accept new targets (Graham-Harrison 2010).

The BASIC group plans to meet every three months to work toward defining their voluntary emission reduction pledges. The BASIC nations met on 24 January 2010, just before the Accord's deadline for submissions (BASIC 2010a). The bloc acknowledged their central role in finalizing the Accord, and emphasized their support for it. According to a joint statement of the BASIC bloc, the member nations "underlined the importance of the Accord as representing a high level political understanding among the participants on some of the contentious issues of the climate change negotiations (BASIC 2010a)."

Although the member nations of the BASIC group already submitted a series of voluntary mitigation actions for 2020 (see nation specific sections that follow this section and Tables 1 and 2), none of four nations explicitly associated themselves with the Accord when they submitted their pledges of actions to the UNFCCC. Rather, they referred to general provisions of the UNFCCC that encourage nations to report on national climate policies. Only South Africa mentioned the Accord in its submission. However, South Africa has now explicitly associated itself with the Accord and each BASIC party has requested to have its nation's name listed in the Accord's opening paragraph.

The BASIC group asserts that equity will be a key issue for any agreement (BASIC 2010b). The bloc calls for the early transfer of fast-start finance of the $10 billion pledged by developed countries at the COP-15 – with a focus on the least developed countries, small island developing states, and African nations – "as proof of their commitment to urgently address the global challenge of climate change" (BASIC 2010a, 2010b). Furthermore, the bloc calls for the implementation of the REDD+ mechanism; architecture of technology development and transfer; adaptation framework encompassing implementation programs; and a work program on measurement, reporting and verification (MRV) of commitments to finance, technology and capacity building support by developed countries, starting with a common reporting format for financial contributions by developed countries (BASIC 2010b).

In addition to holding developed nations to their commitments to assist developing nations, BASIC intends to work closely with the G77/China in order to ensure ambitious and equitable outcomes at the COP-16 through a transparent process (BASIC 2010a, 2010b). BASIC ministers affirmed that the BASIC countries will continue their consultations with other nations and groups – following the "BASIC Plus" approach – in order to facilitate the resolution of contentious issues in the negotiations (BASIC 2010b).

In their most recent meeting, the BASIC ministers noted that domestic legislation in the U.S. had been postponed; to which they indicated that "the world could not wait indefinitely, as it hinders our ability to reach an internationally legally binding agreement (BASIC 2010b)." The BASIC ministers believed that a

legally binding outcome should be concluded at the COP-16 in 2010, or at the latest in South Africa by 2011 (BASIC 2010b). However, on 25 May 2010, Xie Zhenhua, who led China's delegation in Copenhagen, said that negotiators aim to agree to a binding global pact on climate change by the end of 2011 (Graham-Harrison 2010). Xie also stated, “Everyone is now taking pragmatic measures, and working hard in a positive manner, in order that we can achieve a legally binding agreement at next year's meeting in South Africa (Graham-Harrison 2010).” He also said, “...we have not set in advance a goal that we must draw up a legally binding treaty (German Marshall Fund 2009).” Consequently, Xie's statements indicate that it is very unlikely that a binding agreement will be agreed on at the COP-16 in Mexico in 2010.

Brazil

Domestic Climate Policy

During the COP-15, Brazil’s strong *National Policy on Climate Change* (PNMC – *Política Nacional sobre Mudança do Clima*) proposal and its reduction targets gave the country a powerful presence. Brazil eventually drafted the Copenhagen Accord with the U.S., China, India, and South Africa. By legislating the PNMC immediately after the COP-15, Brazil demonstrated its intention to address climate change. Furthermore, environment ministers from the BASIC countries – Brazil, South Africa, India and China – held their first meeting on January 25th to further develop details of the Copenhagen Accord (see the section on BASIC in the preceding section) (Lash 2010).

On 29 December 2009, Brazil instituted the *National Policy on Climate Change* (PNMC – *Política Nacional sobre Mudança do Clima*) through President Lula’s signing of Brazilian law 12.187 (Brazil, 2009). The Principles of the PNMC state (Brazil, 2007),

“Brazil has played its part in the mitigation of climate change and is determined and engaged to do more, taking full advantage of its national capacity under the auspices of a global effort to combat climate change. An adequate flow of financing, technological transfer and capacity building, resulting from international cooperation, will be important elements to help fully meet the objectives stipulated in the National Plan...Brazil will not subordinate its willingness to act to the existence of international cooperation. This cooperation, however, will strengthen national capacity. It is worth emphasizing in this context that the provision of financial and technological support to developing countries is a commitment of developed countries stipulated in the UNFCCC.”

However, the PNMC clearly states Brazil's intention to pursue economic growth and development: “Brazil’s efforts are based on the commitment to reduce social inequality and to increase income by seeking an economic dynamic with a low emissions trajectory, not repeating the pattern and the standards of the countries that have already industrialized (Brazil, 2007).” Brazil intends to “stimulate a better performance” of its economic activities to reduce the GHG emissions of Brazil's GDP, improve the competitiveness of Brazilian products in the international market, and increase income and generate economic surplus that can lead to improved levels of social welfare.

Two months earlier on 10 November 2009, Minister of the Environment, Carlos Minc, stated that Brazil is not going to stop its development by taking measures to curb climate change, such as the emission of greenhouse gases. According to the minister, “Brazil is one of the few countries that can produce more

and emit less", supposedly because of the natural resources that Brazil has. Minc said that Brazil's goals of reducing GHG emissions at the COP-15 will not compromise the country's growth (Gramacho 2009).

Referring to a meeting on 9 November 2009 between President Lula and the ministers involved in the development of the Brazilian proposal for COP-15, Minc stated that, "It was decided that Brazil will set a very strong target of 40% reduction in estimates of emissions for the year 2020." The minister explained that 20% is related to the reduction of deforestation in the Amazon, and the other 20% will come from initiatives to be implemented in sectors such as agriculture (Gramacho 2009).

Although President Lula signed the law legally sanctioning the PNMC, he vetoed language calling for a "gradual abandonment" of the use of fossil fuels after pressure from the Ministry of Mines and Energy (Robinson 2010). The original text would have made it difficult for the future economic growth of Brazil to depend on energy that is increasingly generated from fossil fuels, even though it is predominantly hydroelectric today. With this veto Lula temporarily avoided the contradictory issues concerning Brazil's climate concerns and the planned extraction of its recently discovered vast offshore deep-water oil reserves (Forero 2009; Robinson 2010).

Petrobras, Brazil's state-controlled energy company, is developing a group of recently discovered deep-sea oil fields that energy analysts claim will launch Brazil into the ranks of the world's petro-powers. Petrobras has started a five-year $174 billion project to provide platforms, rigs, support vessels and drilling systems to develop proven oil reserves that could rise from 14.4 billion barrels to more than 30 billion barrels, which would put Brazil in the same league as such major oil exporters as Canada, Kazakhstan, Nigeria, and Qatar (Forero 2009). Petrobras estimates that oil production in Brazil could reach 3.9 million barrels a day by 2020; up from more than 2 million a day now (Forero 2009). Brazilian energy officials predict that Brazil, who was an oil importer five years ago, could have one of the world's largest oil reserves in the next decade. Petrobras's president, José Sergio Gabrielli, said, "It's going to change the role of Brazil in the geopolitics of oil...We are going to become a much bigger producer (Forero 2009)." Although there is a recent bill that calls for the creation of a social fund, financed by Brazil's projected oil revenues, to support poverty alleviation, environmental sustainability programs and other initiatives, whether and how Brazil chooses to use oil money to finance sustainable development and low-emission growth will be a very important issue (Robinson 2010).

According to the PNMC, Brazil plans to focus on two main strategies in order to mitigate and adapt to climate change (Brazil, 2007): (1) significantly reduce emissions from land use change; and (2) continuously increase efficiency in the use of the country's natural resources (e.g., energy, land, materials, human resources).

The PNMC defines actions and measures aimed at mitigation and adaptation to climate change with the following specific objectives, some of which involve voluntary targets (Brazil, 2007):

1. Stimulate efficiency increase of energy, natural, scientific, technological and human resources in a constant search for better practices in the economic sectors

2. Keep a high share (presently 45.8% of the energy matrix consists of renewable energy) of renewable energy in the energy matrix

3. Encourage the sustainable increase in the share of biofuels in the national transport matrix; and

also work towards the structuring of an international market of sustainable biofuels

4. Seek for sustained reduction deforestation rates in order to reach zero illegal deforestation

5. Eliminate the net loss of forest coverage in Brazil by 2015. In addition to preserving forests at the levels stipulated in the previous objective, Brazil intends to double the area of forest plantation from 5.5 million hectares to 11 million hectares in 2020, of which two million hectares with native species. It is worth noting that this plan to increase (double) the area of plantations may result in the loss of forests, other natural ecosystems, and biodiversity. A necessary condition of this objective is the existence of national and international resources, both new and additional, in order to strengthen environmental enforcement and make sustainable the economic activities in forest regions.

6. Strengthen inter-sector actions concerned with the reduction of the vulnerabilities of populations through research, monitoring, communication, education, improvement of infrastructure and emergency response.

7. Identification of environmental impacts resulting from climate change; and stimulate scientific research that can trace out a strategy that can minimize the socioeconomic costs of the country's adaptation

Emissions Trends and Copenhagen Pledges

Brazil does not have quantified obligations to reduce GHG emissions under the UNFCCC. Nevertheless, Brazil has pledged to support the Copenhagen Accord with pledges to reduce its GHG emissions by 36.1% below BAU by 2020, and reduce its rate of deforestation by 70% below 2009 levels by 2017 (Siegel 2010). If there is a significant global commitment action against climate change, then Brazil pledges to reduce its GHG emissions by 38.9% below BAU by 2020, and to reduce deforestation to zero by 2020 (Siegel 2010). A necessary condition to reduce deforestation is the existence of national and international resources, both new and additional, in order to strengthen environmental enforcement and make sustainable the economic activities in forest regions (Brazil, 2007).

In 2005, Brazil was the 4th largest emitter of GHGs (including LULUCF and international bunker fuel), or 6.47% of the world's total GHG emissions (CAIT 2010). Alternatively, in 2005, Brazil was the 7th largest emitter of GHGs (excluding LULUCF, but including international bunker fuel), or 2.65% of the world's total GHG emissions (CAIT 2010). Brazil emitted 15.3 tCO2e per capita in 2005 (including LULUCF and international bunker fuels), which ranked it 21st in terms of international per capita emissions (CAIT 2010). In comparison, the U.S. emitted 23.5 tCO2e per capita (11th place), and China emitted 5.5 tCO2e per capita (93rd place) – all including LULUCF and international bunker fuels (CAIT 2010).

During the period from 1990 – 2005, Brazil's average annual growth rate of GHG emissions (including LULUCF) was 0.8%, which is a total growth of 13.2% for that period (CAIT 2010). This is comparable to the GHG emissions average annual growth rate for the same period of the U.S. (1.0%); and the total growth for the U.S. (15.8%) (CAIT 2010). With an average annual growth rate of 0.8%, Brazil's GHG emissions pledges of 36.1% (or 38.9%) by 2020 would amount to an average annual growth rate of approximately 0.5% (or slightly less than 0.5%) by 2020.

Brazil's insistence on developing and exploiting biofuels will further threaten its national and international food and water security, while adding further stresses and demands on the nation's forests and ecosystems. Since biofuels tend to require fossil fuel inputs (e.g., fuel, agrochemicals), Brazil's commitment to biofuel production may actually increase its GHG emissions. Moreover, the planned expansion of biofuel plantations in Brazil could potentially cause both direct and indirect land-use changes (e.g., biofuel plantations replace rangelands, which replace forests). Although direct land-use changes may have a small impact on carbon emissions, because most biofuel plantations would replace rangeland areas, indirect land-use changes (e.g., those pushing the rangeland frontier into the Amazonian forests) could offset the carbon savings from biofuels (Lapola et al. 2010). For example, soybean biodiesel and sugarcane ethanol each contribute to nearly half of the projected indirect deforestation of 121,970 km^2 by 2020 (Lapola et al. 2010).

Conclusions

Clearly, Brazil's GHG emissions pledge for the Copenhagen Accord would continue to increase atmospheric GHG concentrations regardless of whether the international community (i.e., developed nations) agrees to a significant global climate action commitment and provides Brazil with financial, technological, and market resources to reduce its contributions to climate change. Added to this, Brazil has the potential to become one of the world's largest oil producers within the next couple decades.

Ultimately, Brazil's commitment to unlimited economic growth, its belief that it "can produce more and emit less", and its desire to supply the global market with its oil, natural resources, and exports is antithetical to reducing its contribution to climate change – indeed, it will very likely contribute to climate change. Due to deforestation, environmental degradation and climate change forcing, Brazil's policy of economic growth, oil production, and globalized trade will also threaten the integrity of the Amazon rainforest, which is a critical regulator of global climate, a major carbon sink, a major producer of the planet's oxygen, an important supplier of ecosystem services, and a critical ecosystem for the countless species throughout the world that depend on it. Brazil's climate policy; the actions it takes to mitigate its GHG emissions, land use and deforestation; and its commitment to the negotiating process it has started with the other member nations of the BASIC group will be a key issue to monitor in coming months.

China

Copenhagen Accord

Although the mainstream media has often focused on the disagreements in Copenhagen between China and both the developed and developing nations, Chinese negotiators achieved some important goals before and during the COP-15. For instance, China supported language that established a target of limiting the global temperature increase to 2°C, and acknowledged that "deep cuts in global emissions" will be needed to achieve this target (UNFCCC 2009). China pledged that it will "endeavor to" take domestic actions to mitigate climate change. China's commitments include (Siegel 2010; UNFCCC 2009):

- Reducing its emissions intensity (GHG emissions per unit of gross domestic product (GDP)) by 45% by 2020 compared to its 2005 level

- Increasing the share of non-fossil fuels (e.g., renewable energy) in primary energy consumption to approximately 15% by 2020

- Increasing forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from 2005 levels

- Agreeing to join an international system for biannually reporting national emissions that allows for timely and independent examination, and

- If there is a significant global commitment to act against climate change, then China pledges to achieve peak GHG emissions in 2030, and then reduce GHG emissions to 2005 levels by 2050.

Although more progress in Copenhagen would have been desirable, securing even these public commitments seemed unlikely prior to the COP-15.

As mentioned above, China agreed to language in the Copenhagen Accord that commits developing nations (including China) to report every two years to a multinational body on their national GHG emissions inventories and actions to reduce and limit emissions. China intends to participate in the process of developing this reporting system, which will include "provisions for international consultations and analysis [of the biannual reports] under clearly defined guidelines that will ensure that national sovereignty is respected (UNFCCC 2009)."

The Copenhagen Accord also commits developed countries to provide developing nations with "new and additional" financial resources of $30 billion over the next three years to help them adapt to the impacts of climate change, reduce deforestation, and use low-carbon technologies. Further, developed nations also "commit to a goal of mobilizing jointly $100 billion a year by 2020 to address the needs of developing countries (UNFCCC 2009)." During the Copenhagen meeting, senior Chinese officials suggested that least developing nations and small island nations threatened by sea level rise should be among the first to receive these funds (Bradley 2010).

Before Copenhagen

In the years leading up to Copenhagen, China committed to a variety of bilateral agreements and less formal partnerships that could increase its capacity to reduce its energy use and emissions (Bradley 2010). China's recent statements and policy initiatives demonstrate growing concerns about climate change, energy security, pollution, and the ability to sustain long-term economic strategies for economic growth and reducing poverty. Recent statements and actions in 2009 by Chinese officials include:

- After a cabinet meeting on 12 August 2009, Premier Wen Jiabao warned that climate change threatened China's environmental and economic health. Although it made no mention of emissions cuts, the meeting stressed the urgency of tackling climate change and called for domestic objectives to control GHG emissions (Buckley and Graham-Harrison 2009). The Xinhua news agency said in a summary of the cabinet meeting, "Make objectives for controlling greenhouse gas emissions and adapting to climate change an important basis for setting the medium and long-term development strategies and plans of government at every level (Buckley and Graham-Harrison 2009)."

- On 9 January 2009, China's Climate Change Minister Xie Zhenhua gave a speech at Beijing University's Guanghua School of Management's annual New Year's Symposium, in which he states the urgency of China's pursuing a low-emissions pathway for its own self-interest. He emphasized that a low-emission, energy efficient economy makes sense in order to face the challenges of resource constraints, pollution and poverty. Minister Xie also acknowledged the importance of improving measurement, reporting, and transparency to help ensure effective domestic GHG emissions accounting; and the need for China to report these accounting results both domestically and to the international community (Xie 2010; Xie and ChinaFAQs 2010).

- In 2009, the Standing Committee of the 11th National People's Congress (NPC) endorsed a climate change resolution calling for active engagement in global climate negotiations, and new domestic initiatives to "make carbon reduction a new source of economic growth." The NPC also called for new policies and rules designed to lower China's energy use and emissions. The NPC also endorsed improving China's capacity to deal with "climate disasters." (Xinhua News Agency 2009)

- In 2009, China's government announced that it would increase efforts to close old inefficient power plants and factories, increase spending on renewable energy and energy efficiency, increase incentives for consumers to purchase energy-saving appliances, and new rules that would increase costs for energy wasting firms (Jing 2009).

China has adopted a variety of new energy policies, rules, and targets including goals outlined in the China's "National Climate Change Programme," approved by the State Council in June 2007 (NDRC 2007). China may meet or exceed many of these goals. On 28 April 2010, China's State Council adopted eight new measures to try to make a final push to meet China's 20% energy intensity reduction target during the 5 years from 2006 to the end of 2010. The Chinese government is concerned that its focus on economic stimulus in 2009 and the rapid pace of China's economy recovery have made achieving its 20% target difficult. Although energy efficiency improved by 14.3% in the first four years of the target, achieving the full 20% will be difficult. However, Premier Wen Jiabao has now put greater pressure on the provinces to meet their local targets (Hornby 2010; Seligsohn 2010a).

After Copenhagen

Since Copenhagen, China has acted to reaffirm and progress on its Copenhagen commitments. Although China seems committed to working through the existing United Nations negotiating process, it is also active on climate issues in other fora, such as regularly meeting with the other members of the BASIC bloc since the COP-15. China's 12th Five Year Plan, to be introduced at China's National People's Congress in March 2011, is expected to build on a suite of existing policies, such as (ChinaFAQs 2009):

1. Reducing overall national energy intensity by 20% by 2010 by making large enterprises more efficient; building more efficient and cleaner burning coal-fired power plants; closing wasteful facilities (factories, power plants, and industrial facilities); raising taxes on petroleum; increasing local government action to increase energy efficiency; and assisting consumers to purchase green home appliances with subsidies.

2. Expanding the use of renewable energy. By 2020, China has committed to using non-fossil fuel energy technologies (hydro, wind, solar, biomass, nuclear) to generate at least 15% of its total energy.

Furthermore, the are some formal proposals for a carbon tax circulating around the Chinese government. If approved, the carbon tax could be implemented as early as 2012 (Seligsohn 2010b).

Emissions Trends and Copenhagen Pledges

In 2005, China was the largest emitter of GHGs (including LULUCF and international bunker fuel) in the world, or 16.36% of the world's total GHG emissions (CAIT 2010). In 2005, China was the largest emitter of GHGs (excluding LULUCF and international bunker fuel) in the world, or 19.13% of the world's total GHG emissions (CAIT 2010). In comparison, the U.S. (15.74% of global total) ranked 2nd place, Brazil (6.47%) ranked 4th place, Indonesia (4.63%) ranked 5th place, and Russia (4.58%) – including LULUCF and international bunker fuels (CAIT 2010). The EU-27 (12.08% of global emissions) ranked 3rd place as compared to the above nations, but this figure does not include LULUCF since this information is not available in this analysis (CAIT 2010).

However, China's GHG emissions were 5.5 tonnes (metric tons) CO_2e (tCO2e) per capita (CAIT 2010). Compared with the U.S. (23.5 tCO2e per capita), the EU-27 (10.3 tCO2e per capita; excluding LULUCF), Brazil (15.3 tCO2e per capita), Indonesia (9.3 tCO2e per capita), and Russia (14.1 tCO2e per capita), China's per capita GHG emissions are relatively low for a rapidly developing economy. Excluding LULUCF, China's per capita emissions (5.6 tCO2e per capita) are similar to the per capita emissions of Brazil (5.5 tCO2e per capita); but much greater than India's (1.7 tCO2e per capita) (CAIT 2010).

During the period from 1990 – 2005, China's average annual growth rate of GHG emissions (including LULUCF) was 4.3%, which reflects a total growth of 88.8% for that period (CAIT 2010). This is significantly greater than the GHG emissions average annual growth rate for the same period of the U.S., Indonesia, and Brazil (1.0%, 0.9%, and 0.8% respectively); and the total growth for U.S., Indonesia, and Brazil (15.8%, 14.1%, 13.2% respectively) (CAIT 2010).

In terms of emissions intensity (GHG emissions per unit of GDP), from 1990 – 2005, China's average annual growth of GHG intensity (excluding LULUCF) decreased from 2,879.6 tCO2e per million 2005 international dollars (M Intl$ 2005) to 1,361.3 tCO2e per M Intl$ 2005. This represents an average annual growth rate of -4.9%, for a total growth of -52.7% during this period (CAIT 2010). However, China's emissions intensity is very high compared with developed nations. In 2005, the emissions intensity of China ranked 34th in the world (1,367.0 tCO2e per M Intl$2005), whereas the greatest emissions intensity of the EU-27 member states was for Bulgaria (ranked 67th place globally) 944.4 tCO2e per M Intl$ 2005; and all the western European members were below 500 tCO2e per M Intl$ 2005 (CAIT 2010) – excluding LULUCF, but including international bunker fuels. In comparison, the U.S. ranked 123th in the world with 570.9 tCO2e per M Intl$2005 (excluding LULUCF, but including international bunker fuels) (CAIT 2010).

Moreover, from 1990 – 2005, the U.S. average annual growth of GHG intensity (excluding LULUCF, but including international bunker fuels) decreased from 767.3 tCO2e to 570.9 tCO2e per M Intl$ 2005. This represents an average annual growth rate of -2.0%, for a total growth of -25.6% during this period (CAIT

2010). If China achieves its goal of reducing its emissions intensity by 45% by 2020 compared to its 2005 level, then China's emissions intensity in 2020 would be 748.72 tCO2e per M Intl$ 2005, which is still significantly greater than the emissions intensity of the U.S. in 2005. China's large emissions intensity may be partially a result of China's role as one of the world's largest manufacturers of goods imported by both developed and developing nations. However, China's reliance on coal, and its lax environmental standards and enforcement likely affect its emissions performance, as well.

Conclusion

China's insistence on using fossil fuels to sustain unlimited economic growth and unsustainable development is reflected in the China's Copenhagen Accord pledge to reduce its emissions based on the proportion of its GHG emissions per unit of GDP. Rather than basing its national emissions pledges on absolute emissions targets, China is committing itself to a very vague emissions target since GDP is an approximate and controversial measure of a nation's overall economic output. For example, if the goal of China's economic activities are to produce environmentally sustainable increases unlimited economic growth, poverty alleviation, and in the overall human standard of living, then coupling GHG emissions targets solely with GDP can be a rather meaningless measurement since GDP treats GHG emissions and the loss of ecosystem services as a benefit instead of a cost.

Clearly, China's GHG emissions pledge for the Copenhagen Accord would continue to increase atmospheric GHG concentrations regardless of whether the international community (particularly developed nations) agrees to a significant global climate action commitment and provides China with financial, technological, and market resources to reduce its contributions to climate change. Ultimately, China's commitment to unlimited economic growth fueled by coal and other fossil fuels, its need to support its growing population, and its desire to supply the global market with its exports and natural resources is antithetical to reducing its contribution to climate change. Rather, China's pledges will actually contribute to climate change. Due to fossil fuel use, land use, water demand, environmental degradation, pollution (e.g., black carbon emissions), and other climate change forcings, China's policy of economic growth, coal production, and globalized trade will also threaten the integrity of the Hindu-Kush-Himalaya-Tibetian Plateau; which is a critical regulator of regional and global climate, and a major source of water for approximately 2 – 3 billion people living in the Af-Pak region, South and South-East Asia, China, and Central Asia.

It is very challenging to know China's motivations, intentions, and the sincerity of its Copenhagen Accord commitments. Nevertheless, China’s uncharacteristic decision to take a high-profile role in recent global climate discussions indicates an increasing willingness to expose itself to the potential benefits and risks of international climate negotiations. China is demonstrating its understanding of national interest on interrelated issues like mitigating and adapting to climate change, pollution reduction, environmental sustainability, energy security, economic growth, and reducing poverty. Understanding China's motivations will be critical in order to identify areas of potential conflict and mutual benefit in international climate policy and negotiations. Economic and technical collaboration between China and other nations will also be important to improve energy security for all nations, to develop and reduce the costs of producing and implementing low-emissions technologies and sustainable development, to reduce future global emissions, to reduce deforestation, and to protect the environment.

India

Emissions and Economic Trends

India is a rapidly and steadily growing economy with an increasing contribution to global GHG emissions. Although India is part of the BASIC group of nations, its socioeconomic conditions are significantly inferior than are those of the three other nations in the group. India's total GDP in 2008 was approximately U.S.$ 1.2 trillion, which ranks it in 12th place in the world compared with 3rd place for China (U.S.$ 4.3 trillion), and 10th place for Brazil (U.S.$ 1.6 trillion) – South Africa ranked 31st place with U.S.$ 276 million (World Bank 2009). Yet, the per capita GDP (in terms of purchasing power parity or PPP) of India in 2007 was U.S.$ 2,753, which was the lowest of the bloc. In comparison, per capita GDP for China was U.S.$ 5,383, U.S.$ 9,757 for South Africa, and U.S.$ 9,567 for Brazil (UNDP 2009).

In 2005, India was the 5th largest GHG emitter (excluding LULUCF, but including international bunker fuels) in the world, accounting for approximately 4.84% of total global emissions (CAIT 2010). Estimates of GHG emissions for India including LULUCF are not available for this analysis. In comparison, China was the largest GHG emitter (excluding LULUCF) in the world with 18.75% of the total GHG emissions (CAIT 2010). Brazil and South Africa ranked 7th and 20th largest GHG emitters (excluding LULUCF) accounting for 2.65% and 1.12% of total GHG emissions, respectively (CAIT 2010). In 2005, India's per capita GHG emissions were 1.7 tCO2e (CAIT 2010). Whereas in 2005, China's per capita emissions were 5.6 tCO2e; Brazil's were 5.5 tCO2e; and South Africa's were 9.2 tCO2e (CAIT 2010) – excluding LULUCF.

In India, poverty eradication through economic development is a national priority. The goal of poverty eradication has driven India's economy to grow very rapidly. Approximately 80% of India's population of 1.1 billion in 2007 (over 800 million people) live on less than U.S.$ 2 per day (Ghosh 2009). Economic development is driving energy demand and consumption in India. Approximately half of India's commercial primary energy demand is supplied with coal; and coal supplies about 38% of India's total primary energy (Planning Commission 2006, 2008).

From 1990 – 2005, India's average annual growth of GHG emissions (excluding LULUCF) was 3.6%, which amounted to a total growth of 68.8% for that period (CAIT 2010). India's future emissions will grow, if GHG emissions are not decoupled from economic growth. Since 2004, India's annual GDP growth rates have ranged from 6.7 – 9.7% (EAC 2009). If India's GDP continues to grow within this range, it is likely that India's GHG emissions will also increase significantly.

Domestic Policy

In the context of climate change, India has been pursuing domestic regulatory and funding policies that focus on energy conservation and renewable energy technologies. These policies have been supported by legislation, regulation, and tariff arrangements (Fujiwara and Egenhofer 2010). India's *National Action Plan on Climate Change* is a comprehensive strategy to implement domestic policies on climate change. This national plan outlines policies and measures addressing mitigation and adaptation under eight "missions" through 2017. In particular, the national solar mission and the enhanced energy efficiency missions are designed to mitigate GHG emissions (India 2008). The national solar mission plans to install solar-power generation capacity of 20,000 MW by 2022. The national mission on enhanced energy

efficiency is expected to reduce energy consumption by 5% and save approximately 100 million tonnes of CO_2 annually by 2015.

Based on the *National Action Plan on Climate Change* and the 11th Five Year Plan (2007–12), the government of India is considering a set of nationally accountable mitigation goals and specific performance targets for the years 2020 and 2030 in sectors such as energy, industry, buildings, transport, agriculture, and forestry. The planning commission is also preparing a strategy for a low-emission economy before the start of the 12th Five Year Plan in April 2012 (Fujiwara and Egenhofer 2010). In addition, the states of India also have an important role in implementing energy and climate policies and measures.

International Climate Negotiations

For the Copenhagen Accord, India has pledged to reduce its carbon intensity by 20% below 2005 levels by 2020, and to keep per capita GHG emissions below those of developed countries (Siegel 2010). India potentially pledges to peak its GHG emissions in 2030 in order to reduce them to 2005 levels by 2050, if there is a significant global commitment to climate action (Siegel 2010).

In the international negotiations, India calls for equitable allocation of and equitable access to the global atmospheric commons. Furthermore, India demands strict adherence to the principle of common but differentiated responsibilities and respective capabilities in formulating the climate obligations of the Annex I and Non-Annex I countries. India also demands the right to development, full compensation for incremental mitigation costs, and commitments to deep emission cuts to be taken on by Annex I nations for the second commitment period under the Kyoto Protocol.

Before the COP-15, India defined its basic national interests in the international climate negotiations (Fujiwara and Egenhofer 2010):

1. no legally-binding emissions reduction target for India

2. no legally-binding peaking year for India, and

3. a distinction between supported and unsupported mitigation actions by developing nations in respect of measurement, reporting, and verification (MRV).

The main result of the COP-15 for India was the consensus to continue the dual-track negotiation process under both the UNFCCC and under the Kyoto Protocol. India's voluntary pledge to reduce its emissions intensity was submitted in conformance with the relevant provisions of the UNFCCC that cover voluntary national actions and policies, and with the provisions of the UNFCCC on the reporting of such actions and their review. Therefore, the submission by India does not necessarily refer to the Copenhagen Accord (Fujiwara and Egenhofer 2010).

India expects that the Copenhagen Accord will complement the dual-track climate negotiations. India also asserts that the Copenhagen Accord is not legally binding. Moreover, India recognizes that the Accord does not mention a specific year for the peaking of GHG emissions of developing countries; but rather, the Accord recognizes that the time frame for peaking will be longer in developing nations due to their

priorities for development and poverty eradication. India recognizes the need to limit the average global temperature increase to less than 2°C above pre-industrial levels by the year 2050 in the context of equity and sustainable development as long as the right of developing nations to an equitable share in access to the global atmospheric commons can be ensured. India also maintains that a global climate goal should be expressed only in terms of a limit in global temperature increase; and not in terms of quantified emissions reduction targets that could result in a binding commitment for developing countries. India is also supports that the Accord ensures that developing nations' mitigation actions will be subject to domestic (rather than international) MRV, and that respect for national sovereignty will be protected under the Accord's provisions.

Although the Indian government prefers the guiding principles, it has recently adopted a more adaptive and flexible approach to parts of the international negotiations. In addition to voluntarily submitting its Copenhagen Accord commitments, India continues to engage in the coordination of positions with other major negotiating partners such as the G77/China and BASIC to ensure that the climate negotiations are finalized in accordance with the Kyoto Protocol, UNFCCC, and the Bali Action Plan. The Indian government also continues to participate in the negotiating process by offering proposals on items of special interest such as technology and financial mechanisms and emissions reductions from deforestation (REDD) and land use.

Conclusion

India's insistence on using fossil fuels to sustain unlimited economic growth and unsustainable development is reflected in the India's Copenhagen Accord pledge to reduce its emissions based on the proportion of its GHG emissions per unit of GDP. Rather than basing its national emissions pledges on absolute emissions targets, India is pledging itself to a very vague emissions target since GDP is an approximate and controversial measure of a nation's overall economic output.

India is adamant on its positions to domestically increase energy consumption, and to promote economic growth and development for its more than one billion people. India is also firm on its insistence that the Indian government will not agree to any legally-binding emissions reduction targets for India, nor to any legally-binding emissions peaking year for India. Furthermore, India maintains that a global climate goal should be expressed only in terms of a limit in global temperature increase – and not in terms of quantified emissions reduction targets that could result in a binding commitment for developing countries. In effect, India is promising to commit nothing to mitigate its absolute GHG emissions or its land use policies, or to cooperate with the international community on avoiding dangerous anthropogenic climate change, unless other nations (i.e., developed countries) can provide a very convenient (i.e., low-cost and low-effort to India) solution to the climate problem while ensuring that everyone (at least in India) can live a standard of living similar to that of developed nations (or at least above poverty).

Ultimately, climate change is the greatest threat to India's national security, economy, resource security, and its aspirations to eradicate poverty and raise the standard of living for all its citizens. For example, the drying of the Hindu-Kush-Himalaya-Tibetian Plateau (HKHT) directly threatens the lives and livelihoods of half a billion Indians living in the Ganges River water basin, indirectly threatens the other half of India's population, and directly threatens the populations of neighboring Pakistan (a nuclear-armed adversary), Bangladesh and China. The HKHT also regulates the annual monsoon that provides India and the region with vital rain. Therefore, India has not only effectively pledged to interfere with the global

effort to avoid dangerous climate change by not participating meaningfully in international climate mitigation efforts, it has promised to undermine its own efforts to sustainably develop its economy and eradicate poverty.

Although one might argue that India is historically not responsible for the emissions that have led to dangerous climate change, and that India's per capita GHG emissions of 1.7 tCO2e ranked it 154th in the world in 2005, it was nonetheless responsible for 4.25% of the world's total contributions. Furthermore, the population of India represents approximately 14% of the world's population. Without meaningful participation by India in global climate mitigation efforts, climate change will likely proceed unabated, albeit more slowly.

South Africa

International Climate Negotiations

Although South Africa was the 22nd largest emitter of GHGs in the world in 2005, having contributed to about 0.98% of global GHG emissions, the country is not as important of an international negotiating party as compared to higher-emitting nations such as the U.S. or the other BASIC member nations. However, South Africa's importance in climate negotiations is due to its leadership role in Africa, including the active role South African delegations have taken in climate negotiations (Husar 2010). As an emerging economy, South Africa has some close relations to developed nations, but its interests are similar to those of other developing nations. In this regard, South Africa has the ability to act as a "bridge builder" between developed and developing nations in the international climate policy (Husar 2010).

South Africa's interest in multilateral negotiations to international climate policy is based on South Africa's national interests. For instance, South Africa has incorporated climate policy in its its national agenda at least since it established the National Committee for Climate Change in 1994, the *National Climate Change Response Strategy* in 2004, the *Energy Efficiency Accord* in 2005, and ratified the UNFCCC in 1997 and the Kyoto Protocol in 2002 (Husar 2010). South Africa's interest in multilateral negotiations is also motivated by concerns about its energy use and energy-intensive industries (Husar 2010): a majority of South Africa's energy is generated from coal; inexpensive domestic coal has encouraged energy-intensive industries to locate in South Africa; and emissions-intensive mining and energy sectors (i.e., minerals-energy complex (Fine and Rustomjee 1996)) are critical components of South Africa's economy. This latter point is significant, because the minerals-energy industries tend to veto domestic climate reform, which can slow the development of progressive policy (Husar 2010). Consequently, South Africa's industrial domestic lobby groups affect South Africa's position in international climate negotiations.

South Africa's status as a developing nation affects its climate policy and its negotiating position. Since the country claims to prioritize the eradication of poverty and accelerating its economic growth, the government holds that climate protection measures should not interfere too greatly with these key objectives (Husar 2010). Like other developing nations, South Africa believes that developed nations should be primarily responsible for GHG emissions reductions.

In addition to not accepting binding emissions targets for developing countries, South Africa is also concerned about how future adaptation measures will be financed. South Africa's demand for financial

and technology transfers is central in its negotiating position, which may be necessary to help the nation change to a low-emission economy. South Africa holds that multilateral funds should be "stand alone" financing programs such as developing new agricultural programs and resettlement, rather than the accepting the policy supported by Annex I nations to only provide incremental adaptive measures like dam-building and reducing the climate-related risks to which investment projects are exposed (Husar 2010). South Africa maintains that available international adaptation and technology transfer funds should be increased by up to a hundred times while taking into account historical injustices when distributing funds for adaptation strategies (Husar 2010).

Emissions Trends and Copenhagen Pledges

The South African government has accepted that climate change has the potential to affect almost every sector in South Africa, including energy, water, industry, agriculture, transportation, trade, infrastructural development, finance, and healthcare (Merwe 2010). As part of the Copenhagen Accord, South Africa pledged that national emissions would peak in 2025, then stabilize for 10 years, and then decline thereafter. Additionally, South Africa pledged it would reduce its GHG emissions by 34% below BAU by 2020, and 42% below BAU by 2025. However, these last two commitments were conditional to a legally binding multilateral agreement under the UNFCCC; and to the provision of financial resources, the transfer of technology, and capacity building support by developed nations (Siegel 2010; UNFCCC 2010).

In 2005, South Africa was the 20nd largest emitter of GHGs (excluding LULUCF, but including international bunker fuel), or 1.12% of the world's total GHG emissions (CAIT 2010). Estimates of GHG emissions for South Africa including LULUCF are not available for this analysis. The per capita GHG emissions of South Africa were 9.2 tCO2e in 2005. In comparison, the per capita GHG emissions of the U.S. was 23.9 tCO2e; Brazil was 5.5 tCO2e; EU-27 was 10.9; France was 9.4 tCO2e; China was 5.6 tCO2e; and India was 1.7 tCO2e in 2005 (CAIT 2010).

During the period from 1990 – 2005, South Africa's average annual growth rate of GHG emissions (excluding LULUCF) was 1.6%, which is a total growth of 27.0% for that period (CAIT 2010). Excluding LULUCF, this trend is greater than the world average annual growth rate of 1.6% (26.4% total growth); and almost twice as much as the annual growth rates for the U.S. and Brazil, which were 1.0% and 2.7% (15.5% and 48.1% total growth) for the same period, respectively. However, it is significantly less than the average annual GHG emissions of China and India, which were 4.8% and 3.6% (101.9% and 68.8% total growth) for the same period, respectively (CAIT 2010).

With an average annual growth rate of 1.6%, South Africa's GHG emissions reduction pledges of 34% below BAU by 2020 would amount to an average annual growth rate of approximately 1.1% until 2020. By 2025, South Africa's average annual growth rate would amount to approximately 0.93%. Therefore, by 2020 and 2025, South Africa's average annual growth rate would be comparable to that of the U.S. during the period from 1990 – 2005.

Assuming that the 1990 – 2005 GHG emissions trends can be taken as BAU, then South Africa's total GHG emissions would be approximately 622.7 MtCO2e (million tonnes CO_2e) per year by 2025. Assuming that South Africa achieves its potential pledge to peak and then stabilize its GHG emissions from 2025 – 2035 at 34% and later 42% of BAU, South Africa's total annual GHG emissions would be about 548.7 MtCO2e per year from 2025 – 2035. This is comparable to the annual GHG emissions of

France (573.5 MtCO2e) and Australia (569.9 MtCO2e) during 2005 (CAIT 2010).

Conclusion

Regardless of whether South Africa will fulfill its potential pledges (contingent on receiving aid from developed nations) to reduce its GHG emissions, and despite its intentions to 'green' its economy, the South African government has clearly indicated that it intends to continue its economic development in such as way that would make the GHG emissions of South Africa comparable to the current emissions levels of a developed western nation such as France or Australia.

Following the COP-15, South African negotiators claimed the outcome of the Copenhagen climate talks was disappointing and unacceptable; and that the lack of success was largely due to a flawed process that damaged trust among delegations (Bell 2009). Nevertheless, despite its 'disappointment' at the lack of success at Copenhagen, South Africa has not yet produced a national climate change policy. The government's Department of Environmental Affairs (DEA) stated a “firm intent” to complete South Africa's national climate change policy white paper by the end of 2010. Environmental Affairs Deputy Director General Joanne Yawitch said the DEA hopes to have a ‘green paper’ completed by mid-year, which would be followed by a public consultation process before finalizing the policy. The DEA is the process of creating GHG reporting regulations (Merwe 2010). Further, some of the discussion on how to design a national climate change policy includes considering letting businesses, its energy-intensive industries, and the market self-regulate (Merwe 2010), which may make achieving effective GHG emissions reductions challenging depending on how well regulated business and industry become.

Russia

Emissions Trends and Copenhagen Pledges

Although Russian Federation is a major producer of GHG emissions and fossil fuels, climate change policy rarely makes it to the Russian government policy agenda. Since Russia is one of the world's major exporters of fossil fuel resources (e.g., oil, coal, gas), it has much at stake in the negotiations on the reduction of GHG emissions. Although it may seem that a cold-climate Russia might be able to benefit from a warming climate, Russia will continue to become exposed to multiple environmental and economic threats as its territory warms.

Russia has pledged to reduce its GHG emissions by 15% below 1990 levels by 2020, and then by 50% below 1990 levels by 2050 (Siegel 2010). If there is a significant global commitment action against climate change, then Russia pledges to reduce its GHG emissions by 25% below 1990 levels by 2020 (Siegel 2010).

In 2005, Russia was the 6th largest emitter of GHGs (including LULUCF and international bunker fuels), or 4.58% of the world's total GHG emissions (CAIT 2010). In 2005, Russia was the 4th largest emitter of GHGs (excluding LULUCF, but including international bunker fuels), or 5.06% of the world's total GHG emissions (CAIT 2010). In comparison, the U.S. (15.74% of global total) ranked 2nd place, Brazil (6.47%) ranked 4th place, and Indonesia (4.63%) ranked 5th place – including LULUCF and international bunker fuels (CAIT, 2010). The EU-27 (12.08% of global emissions) ranked 3rd place as compared to the above

nations, but this figure does not include LULUCF since this information is not available in this analysis (CAIT, 2010).

During the period from 1990 – 2005, Russian Federation's average annual growth rate of GHG emissions (including LULUCF and international bunker fuel) was -2.6%, which was a total growth of -33.1% for that period (CAIT 2010). In comparison, the average annual growth rate of GHG emissions (including LULUCF) for the world was 1.2% (20.3% total growth), the U.S. was 1.0% (15.8% total growth), and Brazil was 0.8% (13.2% total growth) (CAIT 2010). The sharp decline in Russia's GHG emissions was largely a result of the collapse of Russia's economy around 1990.

Including LULUCF and international bunker fuel, Russia's GHG emissions were 14.1 tonnes (metric tons) CO_2e (tCO2e) per capita (CAIT, 2010). Compared with the U.S. (23.5 tCO2e per capita), Brazil (15.3 tCO2e per capita), Indonesia (9.3 tCO2e per capita), and China (5.5 tCO2e per capita), Russia's per capita GHG emissions are comparable to those of an emerging economy (CAIT 2010).

With an average annual growth rate of -2.6%, and a total growth of -33.1% below 1990 levels in 2005, Russia's GHG emissions pledges of 15% below 1990 levels by 2020, and then by 50% below 1990 levels by 2050, clearly indicate that Russia has no intention to significantly reduce its emissions trends. Essentially, Russia is stating in its Copenhagen Accord pledges that its policy will not change from business as usual.

Domestic Climate Policy

Russia's ambivalent position on climate targets may be influenced by relevant factors such as its role as a major fossil fuel energy producer and exporter, and its high domestic energy consumption. Additionally, Russia can support the international competitiveness of its industries by keeping energy prices low (Westphal 2010). Therefore, Russia would be economically and geopolitically affected by international climate policy that raises energy costs, and reduces energy demand and GHG emissions through increased energy efficiency and renewable energy. Furthermore, climate change in Russia was not a political issue until recently; nor is much of the Russian public aware of the climate issue (Westphal 2010). Therefore, the lack of lobbying and public pressure on the Russian government to address climate change may also be influencing Russia's ambivalent position on climate change.

However, Russia has made some attempts to create a national climate policy. Some of the development of Russia's climate policy may be influenced by international pressure and the desire to negotiate deals with other nations on other matters of policy and trade. For instance, Russia ratified the Kyoto Protocol in 2004 after agreeing to a complex package deal between Russia and the EU. Part of the deal included an EU commitment to support Russia's entering the World Trade Organization (WTO); in return, Russia pledged to ratify the Kyoto Protocol (Westphal 2010).

Since 2008, Russia increased its interest in developing its climate and energy policy. On 23 April 2009, Prime Minister Putin announced a project to develop a national climate doctrine. This was the first significant recognition of climate change by the government. Although the doctrine is vague and lacks figures, it does acknowledge the consequences of climate change, the impacts of climate change on Russia's national security, and the need for timely and comprehensive government measures. Measures include increasing energy efficiency, investing in renewable energy, and reducing deforestation and

protecting forests. However, the doctrine also emphasizes the need to prioritize national interests. Although Russia opposes the principle of the historic responsibility of nations, the national climate doctrine emphasizes that climate problems can only be solved through an international regime based on UNFCCC principles; including the principle of the common but differentiated responsibilities of every country (Russia 2009; Westphal 2010).

International Climate Negotiations

Despite Russia's involvement in international climate negotiations and its Copenhagen Accord pledges, the Russian government has made it clear that it is primarily concerned with its own national interests – all other policies are subordinate to fulfilling its national agenda. For instance, in September 2009, Russia adopted a national energy strategy for the period until 2030 in which the government plans to emit GHGs up to its 1990 emissions level (Westphal 2010). Since the neoliberalization of its economy in the 1990's, and the economic crisis of 2008, Russia has not yet completed its economic "recovery". Therefore, the primary goal of the Russian government is socioeconomic development and the modernization of its economy. At the COP-15, Russian representatives argued that Russia's sharp reduction of GHG emissions in the past, due in part to its economic crises, has compensated for the increasing emissions of other nations. Consequently, Russia does not recognize any obligation to significantly reduce its GHG emissions.

Moreover, Russia still has other ways in which to potentially interfere with the development of international climate policies. Russia still has about 3.3 – 4.6 billion tons of surplus emissions allowances from the Kyoto Protocol that it has not sold on the emissions market. Therefore, Russia is in the position to undermine the integrity of an emissions market should it choose to put those certificates into the market. Additionally, in November 2009, Prime Minister Putin made a key demand that the international community recognize all Russian forests as carbon sinks. In recognizing Russian forests as carbon sinks, Russia could gain 5 – 10% in credits for Russian CO_2 emissions in 1990, which would allow Russia to avoid making or fulfilling emissions reduction commitments (Westphal 2010).

Russia also maintains its status of being a transition economy, which further reduces its obligations to commit to climate targets. Russia is adamant that it will only join an international climate agreement if all major emitters (e.g., China, U.S.) are also involved. However, Russia would agree to this if such agreements should not diminish Russia's geopolitical status as compared with other major nations (e.g, U.S.), or its economic competitiveness against other major economies (e.g., China, India) (Westphal 2010).

Conclusion

Since the Copenhagen Accord is based on voluntary mitigation targets and lacks significant long-term goals, it does not conflict much with the national interests of the Russian government. Nonetheless, the involvement of Russia in international climate negotiations and policy is very important since Russia is a major GHG emitter, and international climate policy would affect the international energy market and the profitability of its fossil fuel industry. Furthermore, the government likely wishes to be taken seriously in the international community by being involved in the international climate policy arena, since Russia considers itself is a major world power.

Russia's climate policy is not considered by the international community very important as compared with the policies of the U.S., China, and the EU. Russia likely intends to avoid being worse off in relation to the U.S. and China (Westphal 2010). Westphal suggests that out of the the components of the Bali Action Plan – i.e., mitigation, adaptation, financing, and technology – will be very challenging to get Russia to cooperate on the issues of mitigation and financing. However, Westphal suggests that Russia may be more willing to cooperate on the issue of technology transfers.

It is likely that Russia will create a challenging negotiation environment as it may attempt to negotiate over the sale of its surplus Kyoto Protocol emissions allowances and over its proposed forest carbon sinks. Now that Russia has these surplus emissions allowances, it has much to lose and little to gain in this respect. Furthermore, Russia's clear priority for the modernization and growth of its economy will make international climate policy subordinate to its national agenda. If Russia cannot maintain its emission credits and privileged used of flexible market instruments, it may adopt an opt-out strategy. This strategy could undermine a binding legal approach to international climate policy by supporting a combination of domestic voluntary targets and international compliance (Westphal 2010). Russia may be more willing to negotiate if its interest in economic modernization is addressed. In which case, international cooperation and flexible instruments in energy efficiency, energy savings, and renewable energies may be very effective negotiating terms (Westphal 2010).

United States of America

Emissions Trends and Copenhagen Pledges

The involvement of the U.S. in international climate policy is essential for a successful international climate regime. The U.S. has pledged to support the Copenhagen Accord with pledges to reduce its GHG emissions by 17% below 2005 levels by 2020 (Siegel 2010; UNFCCC 2010). If there is a significant global commitment action against climate change, then the U.S. pledges to reduce its GHG emissions by 30% below 2005 levels by 2020, and then to reduce its GHG emissions 75% below 2005 levels by 2050 (Siegel 2010; UNFCCC 2010).

In 2005, the U.S. was the 2nd largest emitter of GHGs (including LULUCF and international bunker fuel), or 15.74% of the world's total GHG emissions (CAIT 2010). Per capita GHG emissions for this period were 23.5 tCO2e; which is comparable to the per capita GHG emissions of Canada (25.0 tCO2e) and Australia (27.9 tCO2e); but substantially more than the per capita emissions of Brazil (15.3 tCO2e), Russia (14.1 tCO2e), China (5.5 tCO2e), and the world average (6.8 tCO2e) (CAIT 2010).

During the period from 1990 – 2005, the average annual growth rate of GHG emissions (including LULUCF and international bunker fuel) in the U.S. was 1.0%, which is a total growth of 15.8% for that period (CAIT 2010). With an average annual growth rate of 1.0%, the GHG emissions pledges of the U.S. to reduce emissions by 17% of 2005 levels by 2020 would require an average annual growth rate of approximately -1.3% between 2005 – 2020. However, assuming BAU from 2005 – 2020, U.S. GHG emissions would rise from 6948.2 MtCO2e in 2005 to 8066.6 MtCO2e by 2020, which represents a total growth of 16.1% for that period.

Therefore, in order for the U.S. to reduce its GHG emissions to 17% below 2005 levels by 2020, the U.S.

would have to reduce its average annual growth of emissions by about 2.3% per year (i.e., -2.3% increase per year) from 2005 – 2020 below BAU. This -2.3% average annual growth in GHG emissions from BAU is comparable to the -2.6% average annual growth of GHG emissions reported by the Russian Federation for the period from 1990 – 2005 (CAIT 2010), which was partially a result of Russia's economic collapse in the early 1990's.

However, in 2010, the U.S. projected that its annual GHG emissions will grow by 4% from 2005 – 2020 (U.S. 2010). Based on these projections, in order to reduce emissions by 17% of 2005 levels by 2020 the U.S. would require an average annual growth rate of approximately -3.3% between 2005 – 2020. This is comparable to the decline in emissions from 1990 – 2005 experienced by the Eastern European nations Bulgaria, Belarus, Romania, and Bosnia and Herzegovina (CAIT 2010); which coincided with their political and economic collapse. In order for the U.S. to achieve its goal of 17% reduction in emissions levels below 2005 by 2020, this would suggest that the U.S. would have to substantially increase its energy efficiency and adopt a large scale "green" energy-based economy and/or reduce its economic growth for a sustained period of time, all of which seems unlikely considering the current U.S. political and economic agendas.

National Climate Policy

As of late 2009, the U.S. was not prepared to effectively contribute to climate policy negotiations due to the uncertainty of its domestic climate policy. Part of this uncertainty in the development of the U.S. climate policy was due to the volatility and conflicting interests of U.S. policy-makers and industrial interests. Furthermore, a political attitude similar to the one that rejected ratifying the Kyoto Protocol contributed to U.S. disagreement to the international climate policy process. Consequently, international climate negotiations and the UN process are being slowed as the international community waits for U.S. climate legislation to pass. Until then, the U.S. cannot commit to any binding targets or meaningful international climate policy. In addition, other nations will not agree to an international climate regime without the participation of and commitments from the U.S..

Although the U.S. industrial, commercial, and residential sectors are all major sources of U.S. GHG emissions, the U.S. military is the largest institutional consumer of fossil fuel in the U.S. government and in the world
. In 2007, the U.S. military's energy costs increased from $10.9 to $13.6 billion, consuming the equivalent of 340,000 barrels of oil a day, or 1.5% of the U.S. total (Montgomery 2007). The U.S. military is concerned about reducing its fuel consumption and using alternative fuels and renewable energy in order to mitigate climate change (considered a national security threat by the military), to reduce fuel costs, to decrease the amount of fuel needed to be delivered to theaters of operation, and to increase domestic energy security (Carmen, Parthemore, and Rogers 2010). The U.S. Department of Defense represents 91% of the U.S. government's fuel consumption, with the Air Force consuming 64% of the U.S. armed forces fuel (U.S. Air Force 2010). Aviation consumes about 62% of the armed forces fuel (U.S. Air Force 2010). Considering the role that the military plays in the U.S. security strategy, the U.S. economy, in securing energy supplies, and in international affairs, it is unlikely that the Department of Defense will substantially reduce its fossil fuel consumption and GHG emissions while the U.S. government prioritizes that it maintains its military presence and activities throughout the world.

The U.S. is currently developing a national climate policy. U.S. policymakers at the federal, regional, and

state level are discussing market-based policies to reduce GHG emissions. Despite some progress in developing national climate policy – such as the American Clean Energy and Security Act and the Clean Energy Jobs and American Power Act – the U.S. is still far from being able to take a meaningful active role in international climate negotiations. Ultimately, the ability of the U.S. to agree to an international climate treaty relies on the approval of the U.S. Senate. The Senate has to ratify every international treaty with a two-thirds majority (i.e., a supermajority). Considering the general discord between the conservative and liberal political factions in the U.S., the priorities of Congressional representatives from states with major fossil fuel reserves, and that the Senate voted unanimously against the internationally binding Kyoto Protocol in 1997 during the Clinton administration, gaining the support of a majority in the Senate to ratify an international climate treaty will likely be an incredibly difficult, if not impossible, challenge for the Obama administration. It may be possible that the U.S. Congress passes national climate legislation that will support international climate policy. However, the effectiveness of any of the climate bills currently considered in Congress is questionable since the Democratic Party lost their supermajority in January 2010.

Adding to the challenge of persuading the Congress to ratify an international climate treaty and legislate national climate policy is the influence of special interests – including energy intensive industries (e.g., oil, coal, agriculture, cement, steel) – who oppose progressive climate legislation. Furthermore, there is a lack of public awareness and pressure on the government to pass climate legislation. Only 43% of the U.S. public surveyed were willing support climate legislation that would slow economic growth, as compared to a strong majority of Western Europeans (72%) who were willing to forgo some economic growth to mitigate climate change (German Marshall Fund 2009). In 2009, only 57% of U.S. citizens surveyed believed that there was solid evidence of climate change; and only 35% believed that it was a very serious problem (Pew 2009).

International Climate Negotiations

The U.S. role in international climate negotiations has improved slightly since the George W. Bush administration. During the Bush administration, the President practiced an obstructionist strategy in UN negotiations. The administration would sometimes involve itself in bilateral and regional climate forums outside the Kyoto Protocol that would promote a free market agenda, allow flexibility, and lack binding emissions reduction obligations for the U.S. (e.g., Asia-Pacific Partnership on Clean Development and Climate) (Mildner and Richert 2010).

The Obama administration is also working outside of the UN process to develop international climate policy. However, the Obama administration is pursuing international climate policy making in a somewhat more multilateral manner than his predecessor. For example, the Obama administration's involvement in the Major Economics Forum, developing and promoting the Copenhagen Accord with the BASIC group of nations, and bilateral negotiations and development policies with China are less blatantly obstructionist and more compatible with the UNFCCC process (Mildner and Richert 2010).

The Obama administration has also increased the nation's involvement in the UN climate negotiating process. In March of 2009, U.S. Climate Envoy Todd Stern stated that the U.S. recognizes its unique responsibility for climate protection at the UN Climate Talks in Bonn. Stern also emphasized that climate protection requires global participation from the world's major economies (Stern 2009). Nonetheless, the outcome of the COP-15 supported some U.S. interests. There are no internationally binding obligations;

nations are free to choose their own base years for measuring emissions; and emissions reduction targets can be chosen independently by each nation. Further, developing nations are required to report their mitigation strategies in order to receive international financial assistance for climate measures.

In May 2010, Todd Stern conceded the U.S. may not have a climate and energy bill passed by the time of the COP-16 in Cancún, Mexico. Stern insisted that passing U.S. climate legislation is not crucial to the talks. Rather, Stern stated that he does not expect a comprehensive international climate treaty to be finalized in Cancún. Rather, he said he would consider the conference successful, if negotiators make considerable progress on challenging issues such as reducing GHG emissions and creating a system of financial aid for poor nations (Olson 2010).

Conclusion

The involvement of the U.S. in international climate policy is essential for a successful international climate regime. Consequently, international climate negotiations and the UN process are being slowed as the international community waits for U.S. climate legislation to pass. Until then, the U.S. cannot commit to any binding targets or meaningful international climate policy. In addition, other nations will not agree to an international climate regime without the participation of and commitments from the U.S.. Until U.S. domestic policy on climate and energy is legislated by Congress, it is unclear whether and when the U.S. will make any binding international commitments. This international impasse is made worse by the U.S. stance that international commitments should conform with U.S. national legislation; rather than letting national legislation be subordinate to international climate policy. Until the U.S. Congress can accept an international legally binding agreement, international climate negotiators will have to concentrate on taking pragmatic steps in the short- and medium-term.

Appendix 1

Total GHG Emissions in 2005
(CAIT, 2010)

(includes land use change & intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6

Country	MtCO2e	Rank	% of World Total	MtCO2e Per Person	Rank
China	7,217.7	(1)	16.36%	5.5	(93)
United States of America	6,948.2	(2)	15.74%	23.5	(11)
European Union (27) [1]	5,332.9	(3)	12.08%	10.9	(46)
Brazil	2,856.2	(4)	6.47%	15.3	(21)
Indonesia	2,045.3	(5)	4.63%	9.3	(57)
Russian Federation	2,020.7	(6)	4.58%	14.1	(26)
India [1]	1,876.6	(7)	4.25%	1.7	(154)
Japan [1]	1,397.4	(8)	3.17%	10.9	(45)
Germany [1]	1,002.7	(9)	2.27%	12.2	(39)
Canada	808.2	(10)	1.83%	25.0	(10)
Mexico	694.0	(11)	1.57%	6.7	(80)
United Kingdom [1]	685.0	(12)	1.55%	11.4	(43)
Korea (South) [1]	609.2	(13)	1.38%	12.7	(34)
Italy [1]	581.5	(14)	1.32%	9.9	(52)
France [1]	573.5	(15)	1.30%	9.4	(55)
Australia [1]	569.9	(16)	1.29%	27.9	(9)
Iran [1]	560.3	(17)	1.27%	8.1	(69)
Ukraine [1]	495.0	(18)	1.12%	10.5	(50)
Spain [1]	470.6	(19)	1.07%	10.8	(47)
Nigeria	457.9	(20)	1.04%	3.2	(119)
Venezuela	454.5	(21)	1.03%	17.1	(18)
South Africa [1]	433.5	(22)	0.98%	9.2	(58)
Turkey	431.1	(23)	0.98%	6.1	(84)
Saudi Arabia [1]	388.9	(24)	0.88%	16.8	(19)
Poland [1]	374.9	(25)	0.85%	9.8	(54)
Thailand [1]	366.5	(26)	0.83%	5.6	(92)
Malaysia [2]	364.6	(27)	0.83%	14.2	(25)
Argentina	351.7	(28)	0.80%	9.1	(60)
Taiwan* [1,2]	299.2	(29)	0.68%	13.1	(31)
Netherlands [1]	288.2	(30)	0.65%	17.7	(16)
Congo, Dem. Republic	269.7	(31)	0.61%	4.6	(107)
Myanmar	261.9	(32)	0.59%	5.5	(96)
Pakistan [1]	243.1	(33)	0.55%	1.6	(156)

Egypt [1]	229.5	(34)	0.52%	3.0	(125)
Philippines	211.7	(35)	0.48%	2.5	(134)
Kazakhstan [1]	206.2	(36)	0.47%	13.6	(28)
United Arab Emirates [1]	205.4	(37)	0.47%	50.0	(2)
Bolivia	201.9	(38)	0.46%	22.0	(12)
Uzbekistan [1]	180.9	(39)	0.41%	6.9	(79)
Colombia [1]	179.7	(40)	0.41%	4.2	(110)
Vietnam [1]	178.5	(41)	0.40%	2.1	(141)
Belgium [1]	175.2	(42)	0.40%	16.7	(20)
Zambia [2]	157.6	(43)	0.36%	13.4	(30)
Peru	147.4	(44)	0.33%	5.3	(97)
Bangladesh [1]	143.2	(45)	0.32%	0.9	(172)
Czech Republic [1]	142.9	(46)	0.32%	14.0	(27)
Algeria [1]	139.6	(47)	0.32%	4.2	(109)
Greece [1]	138.8	(48)	0.31%	12.5	(37)
Singapore [1]	136.7	(49)	0.31%	32.0	(5)
Angola [1,2]	134.2	(50)	0.30%	8.1	(70)
Romania [1]	132.0	(51)	0.30%	6.1	(82)
Ecuador	129.0	(52)	0.29%	9.9	(53)
Sudan [1,2]	123.2	(53)	0.28%	3.2	(121)
Iraq* [1]	120.9	(54)	0.27%	4.6	(106)
Korea (North) [1,3]	118.4	(55)	0.27%	5.0	(101)
Tanzania [2]	110.2	(56)	0.25%	2.8	(128)
Cameroon [2]	107.0	(57)	0.24%	6.0	(85)
Cambodia	106.8	(58)	0.24%	7.7	(73)
Austria [1]	94.3	(59)	0.21%	11.5	(42)
Kuwait [1]	91.6	(60)	0.21%	36.1	(3)
Turkmenistan [1,3]	91.4	(61)	0.21%	18.9	(15)
Guatemala [2]	89.9	(62)	0.20%	7.1	(76)
Chile [1]	89.8	(63)	0.20%	5.5	(94)
Portugal [1]	86.4	(64)	0.20%	8.2	(68)
Israel [1]	84.3	(65)	0.19%	12.2	(38)
Hungary [1]	84.1	(66)	0.19%	8.3	(66)
Belarus [1]	83.5	(67)	0.19%	8.5	(65)
New Zealand [1]	82.5	(68)	0.19%	20.0	(13)
Sweden [1]	74.5	(69)	0.17%	8.3	(67)
Ethiopia [1]	74.0	(70)	0.17%	1.0	(170)
Ireland [1]	72.1	(71)	0.16%	17.3	(17)
Finland [1]	70.8	(72)	0.16%	13.5	(29)
Syria [1,2]	70.7	(73)	0.16%	3.7	(113)
Denmark [1]	68.3	(74)	0.15%	12.6	(35)
Bulgaria [1]	67.5	(75)	0.15%	8.7	(63)
Zimbabwe [2]	65.7	(76)	0.15%	5.3	(98)
Serbia & Montenegro [1,2]	63.1	(77)	0.14%	5.8	(87)
Honduras [2]	63.0	(78)	0.14%	9.2	(59)
Libya [1,2]	62.3	(79)	0.14%	10.5	(49)
Morocco [1,2]	62.0	(80)	0.14%	2.1	(146)

Central African Republic [1,2,3]	61.3 (81)	0.14%	14.6 (24)
Qatar [1,2]	60.4 (82)	0.14%	68.2 (1)
Switzerland [1]	57.4 (83)	0.13%	7.7 (72)
Norway [1]	54.7 (84)	0.12%	11.8 (41)
Papua New Guinea [2,3]	52.6 (85)	0.12%	8.7 (64)
Slovakia [1]	50.2 (86)	0.11%	9.3 (56)
Oman [1,2]	49.6 (87)	0.11%	18.9 (14)
Azerbaijan [1]	48.4 (88)	0.11%	5.8 (88)
Uruguay [1]	43.1 (89)	0.10%	13.0 (32)
Cuba [1,2]	41.6 (90)	0.09%	3.7 (114)
Kenya [1,2]	41.4 (91)	0.09%	1.2 (166)
Nepal [1]	40.6 (92)	0.09%	1.5 (158)
Trinidad & Tobago [1,2]	37.1 (93)	0.08%	28.0 (8)
Tunisia [1,2]	34.2 (94)	0.08%	3.4 (115)
Cote d'Ivoire [1,2]	31.5 (95)	0.07%	1.6 (155)
Croatia [1]	30.7 (96)	0.07%	6.9 (78)
Madagascar [1,2,3]	30.7 (97)	0.07%	1.7 (153)
Uganda [1,3]	30.6 (98)	0.07%	1.1 (167)
Mongolia [1]	30.3 (99)	0.07%	11.9 (40)
Yemen [1,2]	30.1 (100)	0.07%	1.4 (160)
Paraguay [1,2]	28.3 (101)	0.06%	4.8 (104)
Dominican Republic [1,2]	27.1 (102)	0.06%	2.9 (127)
Sri Lanka [1,2]	26.1 (103)	0.06%	1.3 (163)
Mozambique [1,2]	24.5 (104)	0.06%	1.2 (165)
Jordan [1]	23.8 (105)	0.05%	4.4 (108)
Bahrain [1,2]	23.0 (106)	0.05%	31.7 (6)
Senegal [1]	22.7 (107)	0.05%	2.0 (148)
Mali [1,2,3]	22.3 (108)	0.05%	1.9 (149)
Ghana [1,2]	21.7 (109)	0.05%	1.0 (171)
Chad [1,2,3]	20.9 (110)	0.05%	2.1 (145)
Lithuania [1]	20.3 (111)	0.05%	5.9 (86)
Slovenia [1]	20.1 (112)	0.05%	10.1 (51)
Lebanon [1,2]	20.1 (113)	0.05%	5.0 (102)
Bosnia & Herzegovina [1,2,3]	19.8 (114)	0.04%	5.2 (99)
Estonia [1]	19.8 (115)	0.04%	14.7 (23)
Guinea [1,2,3]	19.2 (116)	0.04%	2.1 (143)
Burkina Faso [1,2,3]	17.9 (117)	0.04%	1.3 (164)
Laos [1,3]	17.3 (118)	0.04%	3.0 (126)
Congo [1,2,3]	16.7 (119)	0.04%	4.9 (103)
Gabon [1,2]	14.7 (120)	0.03%	10.7 (48)
Afghanistan [1,2,3]	14.0 (121)	0.03%	0.5 (183)
Luxembourg [1]	13.7 (122)	0.03%	29.5 (7)
Nicaragua [1,2]	13.6 (123)	0.03%	2.5 (133)
Moldova [1]	12.6 (124)	0.03%	3.3 (116)
Jamaica [1,2]	12.5 (125)	0.03%	4.7 (105)
Brunei* [1,2]	12.5 (126)	0.03%	33.4 (4)
Latvia [1]	11.9 (127)	0.03%	5.2 (100)

Botswana [1,2]	11.7 (128)	0.03%	6.4 (81)
Namibia [1,2,3]	11.6 (129)	0.03%	5.7 (90)
Macedonia, FYR [1]	11.2 (130)	0.03%	5.5 (95)
El Salvador [1,2]	11.1 (131)	0.03%	1.8 (151)
Benin [1,2]	11.0 (132)	0.02%	1.4 (161)
Costa Rica [1,2]	10.8 (133)	0.02%	2.5 (132)
Panama [1,2]	10.5 (134)	0.02%	3.3 (118)
Cyprus [1,2]	10.5 (135)	0.02%	12.6 (36)
Tajikistan [1]	9.8 (136)	0.02%	1.5 (157)
Kyrgyzstan [1]	9.7 (137)	0.02%	1.9 (150)
Albania [1]	9.3 (138)	0.02%	3.0 (123)
Equatorial Guinea [1,2,3]	9.3 (139)	0.02%	15.3 (22)
Georgia [1]	9.1 (140)	0.02%	2.0 (147)
Mauritania [1,2,3]	8.9 (141)	0.02%	3.0 (124)
Armenia [1]	7.5 (142)	0.02%	2.5 (136)
Niger [1,2,3]	7.3 (143)	0.02%	0.5 (180)
Haiti [1,2]	7.1 (144)	0.02%	0.8 (177)
Malawi [1,2,3]	6.9 (145)	0.02%	0.5 (181)
Togo [1,2]	6.2 (146)	0.01%	1.0 (168)
Guyana [1,2,3]	5.3 (147)	0.01%	7.0 (77)
Eritrea [1,2]	4.2 (148)	0.01%	0.9 (173)
Solomon Islands [1,2,3]	4.2 (149)	0.01%	8.9 (61)
Iceland [1]	3.9 (150)	0.01%	13.0 (33)
Rwanda [1,2,3]	3.8 (151)	0.01%	0.4 (185)
Mauritius [1,2,3]	3.8 (152)	0.01%	3.1 (122)
Sierra Leone [1,2,3]	3.6 (153)	0.01%	0.7 (178)
Suriname [1,2,3]	3.6 (154)	0.01%	7.3 (74)
Malta [1,2]	3.1 (155)	0.01%	7.8 (71)
Fiji [1,2,3]	2.7 (156)	0.01%	3.3 (117)
Swaziland [1,2,3]	2.7 (157)	0.01%	2.4 (137)
Burundi [1,2,3]	2.6 (158)	0.01%	0.3 (186)
Bahamas [1,2,3]	2.3 (159)	0.01%	7.2 (75)
Guinea-Bissau [1,2,3]	2.0 (160)	0.00%	1.3 (162)
Liberia [1,2,3]	1.9 (161)	0.00%	0.6 (179)
Bhutan [1,2,3]	1.7 (162)	0.00%	2.6 (131)
Lesotho [1,2,3]	1.6 (163)	0.00%	0.8 (176)
Barbados [1,2,3]	1.5 (164)	0.00%	5.7 (89)
Gambia [1,2,3]	1.3 (165)	0.00%	0.9 (175)
Djibouti [1,2,3]	1.2 (166)	0.00%	1.5 (159)
Belize [1,2,3]	1.1 (167)	0.00%	3.9 (111)
Maldives [1,2,3]	0.7 (168)	0.00%	2.5 (135)
Seychelles [1,2,3]	0.7 (169)	0.00%	8.8 (62)
Cape Verde [1,2,3]	0.5 (170)	0.00%	1.0 (169)
Antigua & Barbuda [1,2,3]	0.5 (171)	0.00%	5.6 (91)
Vanuatu [1,2,3]	0.5 (172)	0.00%	2.1 (142)
Saint Lucia [1,2,3]	0.4 (173)	0.00%	2.6 (129)
Samoa [1,2,3]	0.3 (174)	0.00%	1.8 (152)

Comoros [1,2,3]	0.3 (175)	0.00%	0.5 (182)
Grenada [1,2,3]	0.3 (176)	0.00%	2.6 (130)
Saint Vincent & Grenadines [1,2,3]	0.2 (177)	0.00%	2.2 (140)
Tonga [1,2,3]	0.2 (178)	0.00%	2.1 (144)
Saint Kitts & Nevis [1,2,3]	0.2 (179)	0.00%	3.8 (112)
Dominica [1,2,3]	0.2 (180)	0.00%	2.3 (138)
Nauru [1,2,3]	0.1 (181)	0.00%	11.2 (44)
Sao Tome & Principe [1,2,3]	0.1 (182)	0.00%	0.9 (174)
Palau [1,2,3]	0.1 (183)	0.00%	6.1 (83)
Cook Islands [1,2,3]	0.1 (184)	0.00%	3.2 (120)
Kiribati [1,2,3]	0.0 (185)	0.00%	0.5 (184)
Niue [1,2,3]	0.0 (186)	0.00%	2.2 (139)

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

Total GHG Emissions in 2005
(CAIT, 2010)

(excludes land use change, includes intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6

Country	MtCO2e	Rank	% of World Total	MtCO2e Per Person	Rank
China	7,265.0	(1)	18.75%	5.6	(83)
United States of America	7,065.2	(2)	18.23%	23.9	(10)
European Union (27)	5,332.9	(3)	13.76%	10.9	(41)
Russian Federation	1,962.7	(4)	5.06%	13.7	(23)
India	1,876.6	(5)	4.84%	1.7	(149)
Japan	1,397.4	(6)	3.61%	10.9	(40)
Brazil	1,026.2	(7)	2.65%	5.5	(85)
Germany	1,002.7	(8)	2.59%	12.2	(34)
Canada	743.7	(9)	1.92%	23.0	(11)
United Kingdom	685.0	(10)	1.77%	11.4	(38)
Mexico	654.0	(11)	1.69%	6.3	(73)
Korea (South)	609.2	(12)	1.57%	12.7	(29)
Indonesia	586.3	(13)	1.51%	2.7	(118)
Italy	581.5	(14)	1.50%	9.9	(48)
France	573.5	(15)	1.48%	9.4	(50)
Australia	569.9	(16)	1.47%	27.9	(9)
Iran	560.3	(17)	1.45%	8.1	(62)
Ukraine	495.0	(18)	1.28%	10.5	(45)
Spain	470.6	(19)	1.21%	10.8	(42)
South Africa	433.5	(20)	1.12%	9.2	(52)
Turkey	397.1	(21)	1.02%	5.6	(82)
Saudi Arabia	388.9	(22)	1.00%	16.8	(17)
Poland	374.9	(23)	0.97%	9.8	(49)
Thailand	366.5	(24)	0.95%	5.6	(84)
Argentina	318.7	(25)	0.82%	8.2	(60)
Nigeria	299.9	(26)	0.77%	2.1	(135)
Taiwan* [1]	299.2	(27)	0.77%	13.1	(26)
Netherlands	288.2	(28)	0.74%	17.7	(15)
Venezuela	267.5	(29)	0.69%	10.1	(47)
Pakistan	243.1	(30)	0.63%	1.6	(154)
Egypt	229.5	(31)	0.59%	3.0	(114)
Malaysia [1]	225.6	(32)	0.58%	8.8	(54)
Kazakhstan	206.2	(33)	0.53%	13.6	(24)
United Arab Emirates	205.4	(34)	0.53%	50.0	(2)
Uzbekistan	180.9	(35)	0.47%	6.9	(70)

Colombia	179.7	(36)	0.46%	4.2 (99)
Vietnam	178.5	(37)	0.46%	2.1 (133)
Belgium	175.2	(38)	0.45%	16.7 (18)
Bangladesh	143.2	(39)	0.37%	0.9 (172)
Czech Republic	142.9	(40)	0.37%	14.0 (22)
Philippines	141.7	(41)	0.37%	1.7 (150)
Algeria	139.6	(42)	0.36%	4.2 (98)
Greece	138.8	(43)	0.36%	12.5 (32)
Singapore	136.7	(44)	0.35%	32.0 (5)
Angola [1]	134.2	(45)	0.35%	8.1 (63)
Romania	132.0	(46)	0.34%	6.1 (74)
Sudan [1]	123.2	(47)	0.32%	3.2 (110)
Iraq*	120.9	(48)	0.31%	4.6 (95)
Korea (North) [2]	118.4	(49)	0.31%	5.0 (90)
Myanmar	103.9	(50)	0.27%	2.2 (132)
Austria	94.3	(51)	0.24%	11.5 (37)
Congo, Dem. Republic	93.7	(52)	0.24%	1.6 (153)
Kuwait	91.6	(53)	0.24%	36.1 (3)
Turkmenistan [2]	91.4	(54)	0.24%	18.9 (14)
Chile	89.8	(55)	0.23%	5.5 (86)
Portugal	86.4	(56)	0.22%	8.2 (61)
Israel	84.3	(57)	0.22%	12.2 (33)
Hungary	84.1	(58)	0.22%	8.3 (58)
Belarus	83.5	(59)	0.22%	8.5 (57)
New Zealand	82.5	(60)	0.21%	20.0 (12)
Peru	77.4	(61)	0.20%	2.8 (117)
Sweden	74.5	(62)	0.19%	8.3 (59)
Ethiopia	74.0	(63)	0.19%	1.0 (170)
Ireland	72.1	(64)	0.19%	17.3 (16)
Finland	70.8	(65)	0.18%	13.5 (25)
Syria [1]	70.7	(66)	0.18%	3.7 (102)
Denmark	68.3	(67)	0.18%	12.6 (30)
Bulgaria	67.5	(68)	0.17%	8.7 (56)
Serbia & Montenegro [1]	63.1	(69)	0.16%	5.8 (77)
Bolivia	62.9	(70)	0.16%	6.9 (71)
Libya [1]	62.3	(71)	0.16%	10.5 (44)
Morocco [1]	62.0	(72)	0.16%	2.1 (141)
Central African Republic [1,2]	61.3	(73)	0.16%	14.6 (21)
Qatar [1]	60.4	(74)	0.16%	68.2 (1)
Tanzania [1]	59.2	(75)	0.15%	1.5 (155)
Switzerland	57.4	(76)	0.15%	7.7 (65)
Norway	54.7	(77)	0.14%	11.8 (36)
Zambia [1]	51.6	(78)	0.13%	4.4 (97)
Slovakia	50.2	(79)	0.13%	9.3 (51)
Oman [1]	49.6	(80)	0.13%	18.9 (13)
Azerbaijan	48.4	(81)	0.12%	5.8 (78)
Ecuador	45.0	(82)	0.12%	3.4 (104)

Uruguay	43.1 (83)	0.11%	13.0 (27)
Cuba [1]	41.6 (84)	0.11%	3.7 (103)
Kenya [1]	41.4 (85)	0.11%	1.2 (166)
Nepal	40.6 (86)	0.10%	1.5 (157)
Trinidad & Tobago [1]	37.1 (87)	0.10%	28.0 (8)
Cameroon [1]	37.0 (88)	0.10%	2.1 (137)
Tunisia [1]	34.2 (89)	0.09%	3.4 (105)
Cote d'Ivoire [1]	31.5 (90)	0.08%	1.6 (151)
Croatia	30.7 (91)	0.08%	6.9 (69)
Madagascar [1,2]	30.7 (92)	0.08%	1.7 (148)
Uganda [2]	30.6 (93)	0.08%	1.1 (167)
Mongolia	30.3 (94)	0.08%	11.9 (35)
Yemen [1]	30.1 (95)	0.08%	1.4 (159)
Paraguay [1]	28.3 (96)	0.07%	4.8 (93)
Guatemala [1]	27.9 (97)	0.07%	2.2 (130)
Dominican Republic [1]	27.1 (98)	0.07%	2.9 (116)
Sri Lanka [1]	26.1 (99)	0.07%	1.3 (163)
Zimbabwe [1]	25.7 (100)	0.07%	2.1 (139)
Mozambique [1]	24.5 (101)	0.06%	1.2 (165)
Jordan	23.8 (102)	0.06%	4.4 (96)
Bahrain [1]	23.0 (103)	0.06%	31.7 (6)
Cambodia	22.8 (104)	0.06%	1.6 (152)
Senegal	22.7 (105)	0.06%	2.0 (143)
Mali [1,2]	22.3 (106)	0.06%	1.9 (144)
Ghana [1]	21.7 (107)	0.06%	1.0 (171)
Chad [1,2]	20.9 (108)	0.05%	2.1 (140)
Lithuania	20.3 (109)	0.05%	5.9 (76)
Slovenia	20.1 (110)	0.05%	10.1 (46)
Lebanon [1]	20.1 (111)	0.05%	5.0 (91)
Bosnia & Herzegovina [1,2]	19.8 (112)	0.05%	5.2 (88)
Estonia	19.8 (113)	0.05%	14.7 (20)
Guinea [1,2]	19.2 (114)	0.05%	2.1 (136)
Burkina Faso [1,2]	17.9 (115)	0.05%	1.3 (164)
Laos [2]	17.3 (116)	0.04%	3.0 (115)
Congo [1,2]	16.7 (117)	0.04%	4.9 (92)
Honduras [1]	15.0 (118)	0.04%	2.2 (131)
Gabon [1]	14.7 (119)	0.04%	10.7 (43)
Afghanistan [1,2]	14.0 (120)	0.04%	0.5 (183)
Luxembourg	13.7 (121)	0.04%	29.5 (7)
Nicaragua [1]	13.6 (122)	0.04%	2.5 (123)
Moldova	12.6 (123)	0.03%	3.3 (106)
Jamaica [1]	12.5 (124)	0.03%	4.7 (94)
Brunei* [1]	12.5 (125)	0.03%	33.4 (4)
Latvia	11.9 (126)	0.03%	5.2 (89)
Botswana [1]	11.7 (127)	0.03%	6.4 (72)
Namibia [1,2]	11.6 (128)	0.03%	5.7 (80)
Macedonia, FYR	11.2 (129)	0.03%	5.5 (87)

El Salvador [1]	11.1 (130)	0.03%	1.8 (146)
Benin [1]	11.0 (131)	0.03%	1.4 (161)
Costa Rica [1]	10.8 (132)	0.03%	2.5 (122)
Panama [1]	10.5 (133)	0.03%	3.3 (108)
Cyprus [1]	10.5 (134)	0.03%	12.6 (31)
Tajikistan	9.8 (135)	0.03%	1.5 (156)
Kyrgyzstan	9.7 (136)	0.03%	1.9 (145)
Albania	9.3 (137)	0.02%	3.0 (112)
Equatorial Guinea [1,2]	9.3 (138)	0.02%	15.3 (19)
Georgia	9.1 (139)	0.02%	2.0 (142)
Mauritania [1,2]	8.9 (140)	0.02%	3.0 (113)
Papua New Guinea [1,2]	8.6 (141)	0.02%	1.4 (160)
Armenia	7.5 (142)	0.02%	2.5 (125)
Niger [1,2]	7.3 (143)	0.02%	0.5 (180)
Haiti [1]	7.1 (144)	0.02%	0.8 (177)
Malawi [1,2]	6.9 (145)	0.02%	0.5 (181)
Togo [1]	6.2 (146)	0.02%	1.0 (168)
Guyana [1,2]	5.3 (147)	0.01%	7.0 (68)
Eritrea [1]	4.2 (148)	0.01%	0.9 (173)
Solomon Islands [1,2]	4.2 (149)	0.01%	8.9 (53)
Iceland	3.9 (150)	0.01%	13.0 (28)
Rwanda [1,2]	3.8 (151)	0.01%	0.4 (185)
Mauritius [1,2]	3.8 (152)	0.01%	3.1 (111)
Sierra Leone [1,2]	3.6 (153)	0.01%	0.7 (178)
Suriname [1,2]	3.6 (154)	0.01%	7.3 (66)
Malta [1]	3.1 (155)	0.01%	7.8 (64)
Fiji [1,2]	2.7 (156)	0.01%	3.3 (107)
Swaziland [1,2]	2.7 (157)	0.01%	2.4 (126)
Burundi [1,2]	2.6 (158)	0.01%	0.3 (186)
Bahamas [1,2]	2.3 (159)	0.01%	7.2 (67)
Guinea-Bissau [1,2]	2.0 (160)	0.01%	1.3 (162)
Liberia [1,2]	1.9 (161)	0.00%	0.6 (179)
Bhutan [1,2]	1.7 (162)	0.00%	2.6 (121)
Lesotho [1,2]	1.6 (163)	0.00%	0.8 (176)
Barbados [1,2]	1.5 (164)	0.00%	5.7 (79)
Gambia [1,2]	1.3 (165)	0.00%	0.9 (175)
Djibouti [1,2]	1.2 (166)	0.00%	1.5 (158)
Belize [1,2]	1.1 (167)	0.00%	3.9 (100)
Maldives [1,2]	0.7 (168)	0.00%	2.5 (124)
Seychelles [1,2]	0.7 (169)	0.00%	8.8 (55)
Cape Verde [1,2]	0.5 (170)	0.00%	1.0 (169)
Antigua & Barbuda [1,2]	0.5 (171)	0.00%	5.6 (81)
Vanuatu [1,2]	0.5 (172)	0.00%	2.1 (134)
Saint Lucia [1,2]	0.4 (173)	0.00%	2.6 (119)
Samoa [1,2]	0.3 (174)	0.00%	1.8 (147)
Comoros [1,2]	0.3 (175)	0.00%	0.5 (182)
Grenada [1,2]	0.3 (176)	0.00%	2.6 (120)

Saint Vincent & Grenadines [1,2]	0.2 (177)	0.00%	2.2 (129)
Tonga [1,2]	0.2 (178)	0.00%	2.1 (138)
Saint Kitts & Nevis [1,2]	0.2 (179)	0.00%	3.8 (101)
Dominica [1,2]	0.2 (180)	0.00%	2.3 (127)
Nauru [1,2]	0.1 (181)	0.00%	11.2 (39)
Sao Tome & Principe [1,2]	0.1 (182)	0.00%	0.9 (174)
Palau [1,2]	0.1 (183)	0.00%	6.1 (75)
Cook Islands [1,2]	0.1 (184)	0.00%	3.2 (109)
Kiribati [1,2]	0.0 (185)	0.00%	0.5 (184)
Niue [1,2]	0.0 (186)	0.00%	2.2 (128)

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

Growth in Total GHG Emissions, 1990-2005
(CAIT, 2010)

(includes land use change & intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6
Million metric tons CO_2e

Rank	Country	1990	2005	Change	Avg. Annual Growth	Total Growth
23	China	3,822.5	7,217.7	3,395.1	4.3%	88.8%
107	United States of America	6,000.6	6,948.2	947.6	1.0%	15.8%
36	India [1]	1,111.9	1,876.6	764.7	3.6%	68.8%
117	Brazil	2,523.0	2,856.2	333.2	0.8%	13.2%
11	Iran [1]	248.6	560.3	311.7	5.6%	125.4%
17	Korea (South) [1]	314.0	609.2	295.2	4.5%	94.0%
113	Indonesia	1,792.9	2,045.3	252.4	0.9%	14.1%
67	Mexico	506.8	694.0	187.2	2.1%	36.9%
41	Spain [1]	295.2	470.6	175.4	3.2%	59.4%
22	Thailand [1]	193.0	366.5	173.5	4.4%	89.9%
28	Saudi Arabia [1]	215.5	388.9	173.3	4.0%	80.4%
112	Japan [1]	1,224.5	1,397.4	172.9	0.9%	14.1%
62	Australia [1]	409.8	569.9	160.1	2.2%	39.1%
13	Taiwan* [1,2]	140.9	299.2	158.2	5.1%	112.3%
96	Canada	671.0	808.2	137.2	1.2%	20.4%
51	Turkey	295.1	431.1	136.0	2.6%	46.1%
45	Malaysia [2]	241.6	364.6	123.0	2.8%	50.9%
72	Nigeria	340.7	457.9	117.2	2.0%	34.4%
16	United Arab Emirates [1]	105.5	205.4	99.9	4.5%	94.7%
10	Vietnam [1]	78.9	178.5	99.7	5.6%	126.3%
30	Egypt [1]	130.5	229.5	99.0	3.8%	75.9%
37	Pakistan [1]	145.9	243.1	97.2	3.5%	66.6%
82	South Africa [1]	341.3	433.5	92.2	1.6%	27.0%
84	Argentina	277.7	351.7	74.0	1.6%	26.6%
119	Italy [1]	515.2	581.5	66.3	0.8%	12.9%
20	Singapore [1]	70.6	136.7	66.1	4.5%	93.6%
108	Venezuela	393.1	454.5	61.4	1.0%	15.6%
5	Kuwait [1]	33.2	91.6	58.4	7.0%	175.7%
42	Bangladesh [1]	90.4	143.2	52.7	3.1%	58.3%
76	Philippines	159.2	211.7	52.5	1.9%	32.9%
57	Colombia [1]	127.9	179.7	51.7	2.3%	40.4%
98	Congo, Dem. Republic	226.2	269.7	43.5	1.2%	19.2%
4	Qatar [1,2]	18.0	60.4	42.4	8.4%	235.9%
48	Sudan [1,2]	82.1	123.2	41.1	2.7%	50.1%
104	Myanmar	222.7	261.9	39.2	1.1%	17.6%
26	Israel [1]	46.6	84.3	37.8	4.0%	81.1%

33	Chile [1]	52.9	89.8	36.9	3.6%	69.7%
69	Algeria [1]	102.9	139.6	36.7	2.1%	35.6%
114	Netherlands [1]	252.8	288.2	35.4	0.9%	14.0%
64	Iraq* [1]	87.4	120.9	33.4	2.2%	38.2%
99	Bolivia	169.9	201.9	32.1	1.2%	18.9%
6	Oman [1,2]	19.0	49.6	30.5	6.6%	160.3%
93	Peru	120.7	147.4	26.7	1.3%	22.1%
91	Greece [1]	112.8	138.8	26.0	1.4%	23.0%
35	Morocco [1,2]	36.6	62.0	25.3	3.6%	69.2%
66	Portugal [1]	62.9	86.4	23.5	2.1%	37.3%
52	Ethiopia [1]	51.2	74.0	22.8	2.5%	44.6%
111	Belgium [1]	153.5	175.2	21.7	0.9%	14.2%
71	New Zealand [1]	61.1	82.5	21.4	2.0%	35.0%
80	Turkmenistan [1,3]	71.1	91.4	20.3	1.7%	28.5%
141	France [1]	554.3	573.5	19.2	0.2%	3.5%
70	Syria [1,2]	52.2	70.7	18.6	2.1%	35.6%
88	Austria [1]	75.9	94.3	18.4	1.5%	24.2%
78	Ireland [1]	54.9	72.1	17.2	1.8%	31.4%
12	Yemen [1,2]	14.0	30.1	16.1	5.2%	114.4%
95	Guatemala [2]	73.9	89.9	16.0	1.3%	21.7%
32	Tunisia [1,2]	20.1	34.2	14.1	3.6%	70.3%
54	Uruguay [1]	30.3	43.1	12.8	2.4%	42.4%
7	Lebanon [1,2]	8.0	20.1	12.1	6.3%	150.7%
125	Angola [1,2]	122.4	134.2	11.8	0.6%	9.6%
123	Ecuador	117.3	129.0	11.7	0.6%	10.0%
19	Jordan [1]	12.3	23.8	11.5	4.5%	93.9%
53	Trinidad & Tobago [1,2]	25.7	37.1	11.4	2.5%	44.1%
34	Dominican Republic [1,2]	16.0	27.1	11.1	3.6%	69.3%
50	Uganda [1,3]	20.5	30.6	10.1	2.7%	49.2%
77	Nepal [1]	30.7	40.6	9.9	1.9%	32.4%
128	Tanzania [2]	100.8	110.2	9.4	0.6%	9.3%
1	Equatorial Guinea [1,2,3]	0.2	9.3	9.0	27.5%	3,723.6%
129	Cambodia	98.0	106.8	8.8	0.6%	9.0%
43	Senegal [1]	14.4	22.7	8.3	3.1%	57.2%
87	Kenya [1,2]	33.3	41.4	8.1	1.5%	24.3%
55	Sri Lanka [1,2]	18.4	26.1	7.7	2.4%	41.9%
49	Bahrain [1,2]	15.4	23.0	7.6	2.7%	49.4%
134	Cameroon [2]	100.0	107.0	7.0	0.4%	7.0%
38	Laos [1,3]	10.4	17.3	6.9	3.4%	66.2%
40	Burkina Faso [1,2,3]	11.2	17.9	6.7	3.2%	59.7%
58	Mali [1,2,3]	15.9	22.3	6.4	2.3%	39.9%
121	Honduras [2]	56.7	63.0	6.3	0.7%	11.2%
120	Norway [1]	48.5	54.7	6.2	0.8%	12.8%
68	Ghana [1,2]	15.9	21.7	5.7	2.1%	35.9%
15	Namibia [1,2,3]	5.9	11.6	5.7	4.6%	96.7%
143	Uzbekistan [1]	175.8	180.9	5.0	0.2%	2.8%
31	El Salvador [1,2]	6.5	11.1	4.6	3.7%	71.6%

29	Cyprus [1,2]	6.0	10.5	4.6	3.9%	76.5%
39	Panama [1,2]	6.4	10.5	4.1	3.4%	65.0%
109	Cote d'Ivoire [1,2]	27.5	31.5	4.1	0.9%	14.8%
110	Madagascar [1,2,3]	26.8	30.7	3.9	0.9%	14.5%
94	Chad [1,2,3]	17.1	20.9	3.8	1.3%	22.0%
56	Brunei* [1,2]	8.9	12.5	3.6	2.3%	41.0%
75	Nicaragua [1,2]	10.2	13.6	3.4	1.9%	33.2%
90	Congo [1,2,3]	13.5	16.7	3.1	1.4%	23.1%
74	Jamaica [1,2]	9.4	12.5	3.1	1.9%	33.2%
102	Slovenia [1]	17.0	20.1	3.1	1.1%	18.3%
137	Switzerland [1]	54.5	57.4	2.9	0.3%	5.3%
46	Haiti [1,2]	4.7	7.1	2.4	2.8%	50.8%
115	Guinea [1,2,3]	16.8	19.2	2.3	0.9%	13.9%
83	Costa Rica [1,2]	8.5	10.8	2.3	1.6%	26.8%
132	Mongolia [1]	28.2	30.3	2.2	0.5%	7.7%
14	Mauritius [1,2,3]	1.8	3.8	2.0	5.1%	111.8%
131	Mozambique [1,2]	22.6	24.5	1.9	0.5%	8.5%
106	Luxembourg [1]	11.8	13.7	1.9	1.0%	15.8%
118	Gabon [1,2]	13.0	14.7	1.7	0.8%	13.0%
142	Papua New Guinea [2,3]	51.0	52.6	1.6	0.2%	3.2%
146	Sweden [1]	73.1	74.5	1.5	0.1%	2.0%
103	Mauritania [1,2,3]	7.5	8.9	1.4	1.1%	18.3%
140	Paraguay [1,2]	27.0	28.3	1.3	0.3%	4.9%
124	Afghanistan [1,2,3]	12.8	14.0	1.3	0.6%	9.9%
63	Rwanda [1,2,3]	2.8	3.8	1.1	2.2%	38.3%
44	Fiji [1,2,3]	1.8	2.7	0.9	2.9%	52.7%
135	Benin [1,2]	10.3	11.0	0.6	0.4%	6.1%
79	Swaziland [1,2,3]	2.1	2.7	0.6	1.7%	29.0%
100	Iceland [1]	3.3	3.9	0.6	1.2%	18.7%
2	Seychelles [1,2,3]	0.1	0.7	0.6	11.7%	424.4%
3	Maldives [1,2,3]	0.2	0.7	0.5	9.7%	300.6%
60	Liberia [1,2,3]	1.4	1.9	0.5	2.2%	39.5%
24	Belize [1,2,3]	0.6	1.1	0.5	4.3%	86.9%
133	Niger [1,2,3]	6.7	7.3	0.5	0.5%	7.6%
127	Guyana [1,2,3]	4.9	5.3	0.5	0.6%	9.5%
65	Bhutan [1,2,3]	1.2	1.7	0.5	2.1%	37.4%
89	Guinea-Bissau [1,2,3]	1.6	2.0	0.4	1.4%	23.2%
116	Malta [1,2]	2.8	3.1	0.4	0.8%	13.4%
138	Malawi [1,2,3]	6.5	6.9	0.3	0.3%	5.0%
136	Togo [1,2]	5.9	6.2	0.3	0.4%	5.5%
9	Cape Verde [1,2,3]	0.2	0.5	0.3	5.7%	130.6%
81	Djibouti [1,2,3]	0.9	1.2	0.3	1.7%	28.4%
86	Gambia [1,2,3]	1.1	1.3	0.3	1.5%	24.8%
144	Albania [1]	9.1	9.3	0.2	0.2%	2.7%
122	Bahamas [1,2,3]	2.1	2.3	0.2	0.7%	11.0%
126	Burundi [1,2,3]	2.3	2.6	0.2	0.6%	9.5%
21	Saint Lucia [1,2,3]	0.2	0.4	0.2	4.4%	90.9%

105	Barbados [1,2,3]	1.3	1.5	0.2	1.0%	16.1%
147	Libya [1,2]	62.2	62.3	0.2	0.0%	0.3%
27	Grenada [1,2,3]	0.2	0.3	0.1	4.0%	80.9%
18	Saint Vincent & Grenadines [1,2,3]	0.1	0.2	0.1	4.5%	93.9%
73	Antigua & Barbuda [1,2,3]	0.3	0.5	0.1	2.0%	33.8%
145	Suriname [1,2,3]	3.5	3.6	0.1	0.2%	2.6%
92	Vanuatu [1,2,3]	0.4	0.5	0.1	1.4%	22.5%
25	Saint Kitts & Nevis [1,2,3]	0.1	0.2	0.1	4.2%	84.4%
61	Tonga [1,2,3]	0.2	0.2	0.1	2.2%	39.5%
97	Comoros [1,2,3]	0.3	0.3	0.1	1.2%	19.7%
101	Samoa [1,2,3]	0.3	0.3	0.1	1.1%	18.7%
59	Dominica [1,2,3]	0.1	0.2	0.0	2.3%	39.8%
47	Sao Tome & Principe [1,2,3]	0.1	0.1	0.0	2.8%	50.7%
8	Cook Islands [1,2,3]	0.0	0.1	0.0	6.1%	142.5%
130	Nauru [1,2,3]	0.1	0.1	0.0	0.6%	8.9%
85	Kiribati [1,2,3]	0.0	0.0	0.0	1.5%	25.1%
139	Niue [1,2,3]	0.0	0.0	0.0	0.3%	4.9%
152	Lesotho [1,2,3]	1.7	1.6	-0.1	-0.4%	-6.3%
157	Sierra Leone [1,2,3]	4.2	3.6	-0.6	-1.0%	-13.6%
149	Croatia [1]	31.8	30.7	-1.0	-0.2%	-3.3%
148	Finland [1]	72.2	70.8	-1.4	-0.1%	-1.9%
156	Macedonia, FYR [1]	12.7	11.2	-1.5	-0.9%	-12.1%
164	Solomon Islands [1,2,3]	5.9	4.2	-1.7	-2.2%	-28.3%
159	Botswana [1,2]	13.9	11.7	-2.1	-1.1%	-15.4%
151	Denmark [1]	72.8	68.3	-4.5	-0.4%	-6.2%
155	Zimbabwe [2]	73.1	65.7	-7.4	-0.7%	-10.1%
162	Cuba [1,2]	51.8	41.6	-10.3	-1.5%	-19.8%
178	Tajikistan [1]	21.2	9.8	-11.4	-5.0%	-53.7%
171	Bosnia & Herzegovina [1,2,3]	32.5	19.8	-12.7	-3.2%	-39.0%
179	Latvia [1]	27.1	11.9	-15.2	-5.3%	-56.1%
154	Zambia [2]	175.2	157.6	-17.5	-0.7%	-10.0%
183	Armenia [1]	25.1	7.5	-17.6	-7.7%	-70.0%
161	Hungary [1]	102.3	84.1	-18.2	-1.3%	-17.8%
181	Kyrgyzstan [1]	29.4	9.7	-19.7	-7.1%	-67.1%
167	Slovakia [1]	71.1	50.2	-20.9	-2.3%	-29.4%
177	Estonia [1]	42.8	19.8	-23.0	-5.0%	-53.7%
165	Serbia & Montenegro [1,2]	88.1	63.1	-25.0	-2.2%	-28.4%
182	Moldova [1]	38.9	12.6	-26.3	-7.3%	-67.7%
180	Lithuania [1]	46.9	20.3	-26.6	-5.4%	-56.7%
184	Georgia [1]	36.3	9.1	-27.2	-8.8%	-74.9%
173	Azerbaijan [1]	81.4	48.4	-33.0	-3.4%	-40.5%
170	Central African Republic [1,2,3]	95.0	61.3	-33.7	-2.9%	-35.5%
163	Czech Republic [1]	187.2	142.9	-44.3	-1.8%	-23.7%

172	Bulgaria [1]	112.7	67.5	-45.3	-3.4%	-40.2%
166	Korea (North) [1,3]	166.4	118.4	-48.1	-2.2%	-28.9%
153	United Kingdom [1]	733.6	685.0	-48.7	-0.5%	-6.6%
174	Belarus [1]	144.4	83.5	-60.8	-3.6%	-42.1%
158	Poland [1]	440.1	374.9	-65.2	-1.1%	-14.8%
175	Romania [1]	240.8	132.0	-108.8	-3.9%	-45.2%
169	Kazakhstan [1]	315.1	206.2	-108.9	-2.8%	-34.6%
160	Germany [1]	1,214.4	1,002.7	-211.7	-1.3%	-17.4%
150	European Union (27) [1]	5,552.2	5,332.9	-219.3	-0.3%	-3.9%
176	Ukraine [1]	948.0	495.0	-453.0	-4.2%	-47.8%
168	Russian Federation	3,022.3	2,020.7	-1,001.6	-2.6%	-33.1%
--	Eritrea [1,2]	--	4.2	--	--	--
--	Palau [1,2,3]	--	0.1	--	--	--

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

Growth in Total GHG Emissions, 1990-2005
(CAIT, 2010)

(excludes land use change, includes intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6
Million metric tons CO_2e

Rank	Country	1990	2005	Change	Avg. Annual Growth	Total Growth
18	China	3,598.7	7,265.0	3,666.3	4.8%	101.9%
116	United States of America	6,117.7	7,065.2	947.6	1.0%	15.5%
42	India	1,111.9	1,876.6	764.7	3.6%	68.8%
62	Brazil	693.0	1,026.2	333.2	2.7%	48.1%
12	Iran	248.6	560.3	311.7	5.6%	125.4%
21	Korea (South)	314.0	609.2	295.2	4.5%	94.0%
35	Indonesia	333.9	586.3	252.4	3.8%	75.6%
69	Mexico	466.8	654.0	187.2	2.3%	40.1%
50	Spain	295.2	470.6	175.4	3.2%	59.4%
26	Thailand	193.0	366.5	173.5	4.4%	89.9%
32	Saudi Arabia	215.5	388.9	173.3	4.0%	80.4%
120	Japan	1,224.5	1,397.4	172.9	0.9%	14.1%
74	Australia	409.8	569.9	160.1	2.2%	39.1%
15	Taiwan* [1]	140.9	299.2	158.2	5.1%	112.3%
96	Canada	587.6	743.7	156.1	1.6%	26.6%
56	Turkey	261.1	397.1	136.0	2.8%	52.1%
13	Malaysia [1]	102.6	225.6	123.0	5.4%	119.8%
46	Nigeria	182.7	299.9	117.2	3.4%	64.1%
20	United Arab Emirates	105.5	205.4	99.9	4.5%	94.7%
11	Vietnam	78.9	178.5	99.7	5.6%	126.3%
34	Egypt	130.5	229.5	99.0	3.8%	75.9%
43	Pakistan	145.9	243.1	97.2	3.5%	66.6%
94	South Africa	341.3	433.5	92.2	1.6%	27.0%
89	Argentina	244.7	318.7	74.0	1.8%	30.2%
125	Italy	515.2	581.5	66.3	0.8%	12.9%
24	Singapore	70.6	136.7	66.1	4.5%	93.6%
90	Venezuela	206.1	267.5	61.4	1.8%	29.8%
5	Kuwait	33.2	91.6	58.4	7.0%	175.7%
52	Bangladesh	90.4	143.2	52.7	3.1%	58.3%
51	Philippines	89.2	141.7	52.5	3.1%	58.8%
68	Colombia	127.9	179.7	51.7	2.3%	40.4%
28	Congo, Dem. Republic	50.2	93.7	43.5	4.2%	86.5%
4	Qatar [1]	18.0	60.4	42.4	8.4%	235.9%
59	Sudan [1]	82.1	123.2	41.1	2.7%	50.1%
48	Myanmar	64.7	103.9	39.2	3.2%	60.6%
30	Israel	46.6	84.3	37.8	4.0%	81.1%

39	Chile	52.9	89.8	36.9	3.6%	69.7%
80	Algeria	102.9	139.6	36.7	2.1%	35.6%
121	Netherlands	252.8	288.2	35.4	0.9%	14.0%
76	Iraq*	87.4	120.9	33.4	2.2%	38.2%
17	Bolivia	30.9	62.9	32.1	4.9%	103.8%
6	Oman [1]	19.0	49.6	30.5	6.6%	160.3%
54	Peru	50.7	77.4	26.7	2.9%	52.7%
105	Greece	112.8	138.8	26.0	1.4%	23.0%
41	Morocco [1]	36.6	62.0	25.3	3.6%	69.2%
78	Portugal	62.9	86.4	23.5	2.1%	37.3%
63	Ethiopia	51.2	74.0	22.8	2.5%	44.6%
119	Belgium	153.5	175.2	21.7	0.9%	14.2%
83	New Zealand	61.1	82.5	21.4	2.0%	35.0%
92	Turkmenistan [2]	71.1	91.4	20.3	1.7%	28.5%
142	France	554.3	573.5	19.2	0.2%	3.5%
81	Syria [1]	52.2	70.7	18.6	2.1%	35.6%
100	Austria	75.9	94.3	18.4	1.5%	24.2%
88	Ireland	54.9	72.1	17.2	1.8%	31.4%
14	Yemen [1]	14.0	30.1	16.1	5.2%	114.4%
9	Guatemala [1]	11.9	27.9	16.0	5.9%	135.2%
38	Tunisia [1]	20.1	34.2	14.1	3.6%	70.3%
65	Uruguay	30.3	43.1	12.8	2.4%	42.4%
7	Lebanon [1]	8.0	20.1	12.1	6.3%	150.7%
129	Angola [1]	122.4	134.2	11.8	0.6%	9.6%
82	Ecuador	33.3	45.0	11.7	2.0%	35.3%
23	Jordan	12.3	23.8	11.5	4.5%	93.9%
64	Trinidad & Tobago [1]	25.7	37.1	11.4	2.5%	44.1%
40	Dominican Republic [1]	16.0	27.1	11.1	3.6%	69.3%
61	Uganda [2]	20.5	30.6	10.1	2.7%	49.2%
87	Nepal	30.7	40.6	9.9	1.9%	32.4%
109	Tanzania [1]	49.8	59.2	9.4	1.2%	18.8%
1	Equatorial Guinea [1,2]	0.2	9.3	9.0	27.5%	3,723.6%
47	Cambodia	14.0	22.8	8.8	3.3%	63.2%
53	Senegal	14.4	22.7	8.3	3.1%	57.2%
99	Kenya [1]	33.3	41.4	8.1	1.5%	24.3%
66	Sri Lanka [1]	18.4	26.1	7.7	2.4%	41.9%
60	Bahrain [1]	15.4	23.0	7.6	2.7%	49.4%
103	Cameroon [1]	30.0	37.0	7.0	1.4%	23.2%
44	Laos [2]	10.4	17.3	6.9	3.4%	66.2%
49	Burkina Faso [1,2]	11.2	17.9	6.7	3.2%	59.7%
70	Mali [1,2]	15.9	22.3	6.4	2.3%	39.9%
36	Honduras [1]	8.7	15.0	6.3	3.7%	73.0%
126	Norway	48.5	54.7	6.2	0.8%	12.8%
79	Ghana [1]	15.9	21.7	5.7	2.1%	35.9%
19	Namibia [1,2]	5.9	11.6	5.7	4.6%	96.7%
143	Uzbekistan	175.8	180.9	5.0	0.2%	2.8%
37	El Salvador [1]	6.5	11.1	4.6	3.7%	71.6%

33	Cyprus [1]	6.0	10.5	4.6	3.9%	76.5%
45	Panama [1]	6.4	10.5	4.1	3.4%	65.0%
117	Cote d'Ivoire [1]	27.5	31.5	4.1	0.9%	14.8%
118	Madagascar [1,2]	26.8	30.7	3.9	0.9%	14.5%
107	Chad [1,2]	17.1	20.9	3.8	1.3%	22.0%
67	Brunei* [1]	8.9	12.5	3.6	2.3%	41.0%
86	Nicaragua [1]	10.2	13.6	3.4	1.9%	33.2%
104	Congo [1,2]	13.5	16.7	3.1	1.4%	23.1%
85	Jamaica [1]	9.4	12.5	3.1	1.9%	33.2%
112	Slovenia	17.0	20.1	3.1	1.1%	18.3%
138	Switzerland	54.5	57.4	2.9	0.3%	5.3%
57	Haiti [1]	4.7	7.1	2.4	2.8%	50.8%
122	Guinea [1,2]	16.8	19.2	2.3	0.9%	13.9%
95	Costa Rica [1]	8.5	10.8	2.3	1.6%	26.8%
134	Mongolia	28.2	30.3	2.2	0.5%	7.7%
16	Mauritius [1,2]	1.8	3.8	2.0	5.1%	111.8%
133	Mozambique [1]	22.6	24.5	1.9	0.5%	8.5%
115	Luxembourg	11.8	13.7	1.9	1.0%	15.8%
124	Gabon [1]	13.0	14.7	1.7	0.8%	13.0%
101	Papua New Guinea [1,2]	7.0	8.6	1.6	1.4%	23.5%
146	Sweden	73.1	74.5	1.5	0.1%	2.0%
113	Mauritania [1,2]	7.5	8.9	1.4	1.1%	18.3%
141	Paraguay [1]	27.0	28.3	1.3	0.3%	4.9%
128	Afghanistan [1,2]	12.8	14.0	1.3	0.6%	9.9%
75	Rwanda [1,2]	2.8	3.8	1.1	2.2%	38.3%
55	Fiji [1,2]	1.8	2.7	0.9	2.9%	52.7%
136	Benin [1]	10.3	11.0	0.6	0.4%	6.1%
91	Swaziland [1,2]	2.1	2.7	0.6	1.7%	29.0%
110	Iceland	3.3	3.9	0.6	1.2%	18.7%
2	Seychelles [1,2]	0.1	0.7	0.6	11.7%	424.4%
3	Maldives [1,2]	0.2	0.7	0.5	9.7%	300.6%
72	Liberia [1,2]	1.4	1.9	0.5	2.2%	39.5%
27	Belize [1,2]	0.6	1.1	0.5	4.3%	86.9%
135	Niger [1,2]	6.7	7.3	0.5	0.5%	7.6%
131	Guyana [1,2]	4.9	5.3	0.5	0.6%	9.5%
77	Bhutan [1,2]	1.2	1.7	0.5	2.1%	37.4%
102	Guinea-Bissau [1,2]	1.6	2.0	0.4	1.4%	23.2%
123	Malta [1]	2.8	3.1	0.4	0.8%	13.4%
139	Malawi [1,2]	6.5	6.9	0.3	0.3%	5.0%
137	Togo [1]	5.9	6.2	0.3	0.4%	5.5%
10	Cape Verde [1,2]	0.2	0.5	0.3	5.7%	130.6%
93	Djibouti [1,2]	0.9	1.2	0.3	1.7%	28.4%
98	Gambia [1,2]	1.1	1.3	0.3	1.5%	24.8%
144	Albania	9.1	9.3	0.2	0.2%	2.7%
127	Bahamas [1,2]	2.1	2.3	0.2	0.7%	11.0%
130	Burundi [1,2]	2.3	2.6	0.2	0.6%	9.5%
25	Saint Lucia [1,2]	0.2	0.4	0.2	4.4%	90.9%

114	Barbados [1,2]	1.3	1.5	0.2	1.0%	16.1%
147	Libya [1]	62.2	62.3	0.2	0.0%	0.3%
31	Grenada [1,2]	0.2	0.3	0.1	4.0%	80.9%
22	Saint Vincent & Grenadines [1,2]	0.1	0.2	0.1	4.5%	93.9%
84	Antigua & Barbuda [1,2]	0.3	0.5	0.1	2.0%	33.8%
145	Suriname [1,2]	3.5	3.6	0.1	0.2%	2.6%
106	Vanuatu [1,2]	0.4	0.5	0.1	1.4%	22.5%
29	Saint Kitts & Nevis [1,2]	0.1	0.2	0.1	4.2%	84.4%
73	Tonga [1,2]	0.2	0.2	0.1	2.2%	39.5%
108	Comoros [1,2]	0.3	0.3	0.1	1.2%	19.7%
111	Samoa [1,2]	0.3	0.3	0.1	1.1%	18.7%
71	Dominica [1,2]	0.1	0.2	0.0	2.3%	39.8%
58	Sao Tome & Principe [1,2]	0.1	0.1	0.0	2.8%	50.7%
8	Cook Islands [1,2]	0.0	0.1	0.0	6.1%	142.5%
132	Nauru [1,2]	0.1	0.1	0.0	0.6%	8.9%
97	Kiribati [1,2]	0.0	0.0	0.0	1.5%	25.1%
140	Niue [1,2]	0.0	0.0	0.0	0.3%	4.9%
152	Lesotho [1,2]	1.7	1.6	-0.1	-0.4%	-6.3%
155	Sierra Leone [1,2]	4.2	3.6	-0.6	-1.0%	-13.6%
149	Croatia	31.8	30.7	-1.0	-0.2%	-3.3%
148	Finland	72.2	70.8	-1.4	-0.1%	-1.9%
154	Macedonia, FYR	12.7	11.2	-1.5	-0.9%	-12.1%
164	Solomon Islands [1,2]	5.9	4.2	-1.7	-2.2%	-28.3%
157	Botswana [1]	13.9	11.7	-2.1	-1.1%	-15.4%
151	Denmark	72.8	68.3	-4.5	-0.4%	-6.2%
161	Zimbabwe [1]	33.1	25.7	-7.4	-1.7%	-22.4%
160	Cuba [1]	51.8	41.6	-10.3	-1.5%	-19.8%
178	Tajikistan	21.2	9.8	-11.4	-5.0%	-53.7%
171	Bosnia & Herzegovina [1,2]	32.5	19.8	-12.7	-3.2%	-39.0%
179	Latvia	27.1	11.9	-15.2	-5.3%	-56.1%
163	Zambia [1]	69.2	51.6	-17.5	-1.9%	-25.4%
183	Armenia	25.1	7.5	-17.6	-7.7%	-70.0%
159	Hungary	102.3	84.1	-18.2	-1.3%	-17.8%
181	Kyrgyzstan	29.4	9.7	-19.7	-7.1%	-67.1%
167	Slovakia	71.1	50.2	-20.9	-2.3%	-29.4%
177	Estonia	42.8	19.8	-23.0	-5.0%	-53.7%
165	Serbia & Montenegro [1]	88.1	63.1	-25.0	-2.2%	-28.4%
182	Moldova	38.9	12.6	-26.3	-7.3%	-67.7%
180	Lithuania	46.9	20.3	-26.6	-5.4%	-56.7%
184	Georgia	36.3	9.1	-27.2	-8.8%	-74.9%
173	Azerbaijan	81.4	48.4	-33.0	-3.4%	-40.5%
170	Central African Republic [1,2]	95.0	61.3	-33.7	-2.9%	-35.5%
162	Czech Republic	187.2	142.9	-44.3	-1.8%	-23.7%
172	Bulgaria	112.7	67.5	-45.3	-3.4%	-40.2%

166	Korea (North) [2]	166.4	118.4	-48.1	-2.2%	-28.9%
153	United Kingdom	733.6	685.0	-48.7	-0.5%	-6.6%
174	Belarus	144.4	83.5	-60.8	-3.6%	-42.1%
156	Poland	440.1	374.9	-65.2	-1.1%	-14.8%
175	Romania	240.8	132.0	-108.8	-3.9%	-45.2%
169	Kazakhstan	315.1	206.2	-108.9	-2.8%	-34.6%
158	Germany	1,214.4	1,002.7	-211.7	-1.3%	-17.4%
150	European Union (27)	5,552.2	5,332.9	-219.3	-0.3%	-3.9%
176	Ukraine	948.0	495.0	-453.0	-4.2%	-47.8%
168	Russian Federation	2,964.3	1,962.7	-1,001.6	-2.7%	-33.8%
--	Eritrea [1]	--	4.2	--	--	--
--	Palau [1,2]	--	0.1	--	--	--

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

GHG Intensity of Economy in 2005
(CAIT, 2010)

(includes land use change & intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6

Rank	Country	tCO2e Eq./Mill. Intl $	Index
1	Central African Republic [1,2,3]	22,691.3	100.0
2	Congo, Dem. Republic	16,844.7	74.0
3	Zambia [3]	11,914.7	52.1
4	Bolivia	5,853.2	25.1
5	Cambodia	5,303.0	22.7
6	Papua New Guinea [2,3]	4,607.0	19.6
7	Mongolia [1]	4,553.5	19.3
8	Solomon Islands [1,2,3]	4,315.5	18.3
9	Turkmenistan [1,2]	4,043.1	17.1
10	Myanmar	3,524.3	14.8
11	Uzbekistan [1]	3,454.0	14.4
12	Cameroon [3]	3,068.7	12.7
13	Korea (North) [1,2]	2,959.3	12.2
14	Guyana [1,2,3]	2,923.4	12.1
15	Indonesia	2,900.4	12.0
16	Honduras [3]	2,793.9	11.5
17	Zimbabwe [3]	2,738.8	11.3
18	Tanzania [3]	2,730.5	11.2
19	Guinea-Bissau [1,2,3]	2,702.7	11.1
20	Nauru [1,2,3]	2,432.3	9.9
21	Angola [1,3]	2,235.6	9.0
22	Serbia & Montenegro [1,3]	2,222.8	9.0
23	Sudan [1,3]	1,989.3	7.9
24	Madagascar [1,2,3]	1,973.1	7.9
25	Guinea [1,2,3]	1,970.0	7.8
26	Mali [1,2,3]	1,912.8	7.6
27	Ukraine [1]	1,882.1	7.5
28	Nigeria	1,871.9	7.4
29	Brazil	1,804.7	7.1
30	Liberia [1,2,3]	1,776.9	7.0
31	Mauritania [1,2,3]	1,773.2	7.0
32	Laos [1,2]	1,765.3	6.9
33	Mozambique [1,3]	1,763.8	6.9
34	Guatemala [3]	1,740.4	6.8
35	Venezuela	1,723.0	6.7
36	Ethiopia [1]	1,566.5	6.1
37	Kazakhstan [1]	1,564.5	6.0

38	Nepal [1]	1,559.9	6.0
39	Trinidad & Tobago [1,3]	1,483.2	5.7
40	Moldova [1]	1,480.8	5.7
41	Eritrea [1,3]	1,475.7	5.6
42	Ecuador	1,466.0	5.6
43	Chad [1,2,3]	1,401.6	5.3
44	Congo [1,2,3]	1,395.2	5.3
45	China	1,358.1	5.1
46	Uruguay [1]	1,346.7	5.1
47	Togo [1,3]	1,336.5	5.0
48	Iraq* [1]	1,284.5	4.8
49	Azerbaijan [1]	1,283.3	4.8
50	Burkina Faso [1,2,3]	1,251.8	4.7
51	Senegal [1]	1,246.5	4.6
52	Paraguay [1,3]	1,229.8	4.6
53	Malaysia [3]	1,210.0	4.5
54	Suriname [1,2,3]	1,198.0	4.4
55	Russian Federation	1,190.1	4.4
56	Uganda [1,2]	1,183.4	4.4
57	Bahrain [1,3]	1,129.4	4.1
58	Cuba [1,3]	1,122.3	4.1
59	Sierra Leone [1,2,3]	1,111.8	4.0
60	Kyrgyzstan [1]	1,090.3	3.9
61	South Africa [1]	1,087.1	3.9
62	Nicaragua [1,3]	1,075.1	3.9
63	Qatar [1,3]	1,072.8	3.9
64	Namibia [1,2,3]	1,067.4	3.8
65	Benin [1,3]	1,065.1	3.8
66	Cote d'Ivoire [1,3]	1,050.0	3.8
67	United Arab Emirates [1]	1,025.2	3.6
68	Burundi [1,2,3]	1,017.7	3.6
69	Tajikistan [1]	1,014.4	3.6
70	Jordan [1]	1,012.7	3.6
71	Vietnam [1]	1,002.6	3.5
72	Belarus [1]	1,000.5	3.5
73	Oman [1,3]	969.3	3.4
74	Bulgaria [1]	944.4	3.3
75	Niger [1,2,3]	937.1	3.3
76	Syria [1,3]	935.4	3.2
77	Estonia [1]	895.2	3.1
78	Australia [1]	881.5	3.0
79	Bangladesh [1]	874.5	3.0
80	Iran [1]	870.7	3.0
81	Thailand [1]	865.2	2.9
82	Kenya [1,3]	862.1	2.9
83	Philippines	845.8	2.8
84	Bosnia & Herzegovina [1,2,3]	841.2	2.8

85	Argentina	839.3	2.8
86	Libya [1,3]	838.4	2.8
87	Peru	837.2	2.8
88	Kuwait [1]	829.6	2.8
89	Ghana [1,3]	828.4	2.8
90	Gabon [1,3]	824.0	2.8
91	New Zealand [1]	807.4	2.7
92	Djibouti [1,2,3]	807.1	2.7
93	Malawi [1,2,3]	799.6	2.6
94	Saudi Arabia [1]	792.7	2.6
95	Fiji [1,2,3]	779.1	2.6
96	India [1]	767.5	2.5
97	Bhutan [1,2,3]	765.1	2.5
98	Gambia [1,2,3]	754.0	2.4
99	Singapore [1]	732.4	2.3
100	Macedonia, FYR [1]	718.3	2.3
101	Haiti [1,3]	717.9	2.3
102	Pakistan [1]	714.4	2.3
103	Canada	713.4	2.3
104	Poland [1]	712.7	2.3
105	Brunei* [1,3]	711.1	2.2
106	Palau [1,2,3]	697.0	2.2
107	Egypt [1]	688.8	2.2
108	Czech Republic [1]	685.4	2.1
109	Jamaica [1,3]	673.8	2.1
110	Vanuatu [1,2,3]	664.7	2.0
111	Yemen [1,3]	651.9	2.0
112	Romania [1]	651.6	2.0
113	Lesotho [1,2,3]	643.2	1.9
114	Niue [1,2,3]	639.7	1.9
115	Afghanistan [1,2,3]	627.1	1.9
116	Sao Tome & Principe [1,2,3]	624.3	1.9
117	Maldives [1,2,3]	618.8	1.8
118	Belize [1,2,3]	618.1	1.8
119	Equatorial Guinea [1,2,3]	615.9	1.8
120	Tonga [1,2,3]	608.5	1.8
121	Armenia [1]	598.6	1.7
122	Algeria [1]	591.9	1.7
123	Colombia [1]	579.4	1.7
124	Georgia [1]	577.2	1.7
125	Slovakia [1]	576.1	1.6
126	Morocco [1,3]	572.8	1.6
127	Cyprus [1,3]	568.7	1.6
128	United States of America	561.4	1.6
129	Swaziland [1,2,3]	559.3	1.6
130	Korea (South) [1]	555.5	1.6
131	Turkey	551.9	1.5

132	Mexico	535.8	1.5
133	Rwanda [1,2,3]	535.4	1.5
134	Botswana [1,3]	528.8	1.4
135	Tunisia [1,3]	528.6	1.4
136	Israel [1]	524.3	1.4
137	Lebanon [1,3]	524.0	1.4
138	Belgium [1]	522.0	1.4
139	Netherlands [1]	507.4	1.3
140	Seychelles [1,2,3]	504.3	1.3
141	Greece [1]	499.1	1.3
142	Hungary [1]	491.8	1.3
143	Taiwan* [1,3]	489.8	1.3
144	Albania [1]	487.0	1.3
145	Dominican Republic [1,3]	458.2	1.1
146	Comoros [1,2,3]	456.9	1.1
147	Croatia [1]	455.3	1.1
148	Chile [1]	452.7	1.1
149	Ireland [1]	451.2	1.1
150	Samoa [1,2,3]	443.6	1.1
151	Finland [1]	439.8	1.0
152	Luxembourg [1]	435.4	1.0
153	Slovenia [1]	429.3	1.0
154	Lithuania [1]	418.6	0.9
155	European Union (27) [1]	404.7	0.9
156	Portugal [1]	396.5	0.9
157	Spain [1]	396.3	0.8
158	Latvia [1]	396.1	0.8
159	Germany [1]	387.3	0.8
160	Bahamas [1,2,3]	383.2	0.8
161	Denmark [1]	378.9	0.8
162	Cape Verde [1,2,3]	378.6	0.8
163	Cook Islands [1,2,3]	375.4	0.8
164	Malta [1,3]	373.8	0.7
165	Sri Lanka [1,3]	373.6	0.7
166	Iceland [1]	372.9	0.7
167	Grenada [1,2,3]	363.1	0.7
168	Japan [1]	360.8	0.7
169	Panama [1,3]	354.5	0.7
170	United Kingdom [1]	353.1	0.7
171	Italy [1]	352.8	0.7
172	Antigua & Barbuda [1,2,3]	351.5	0.7
173	Austria [1]	340.6	0.6
174	El Salvador [1,3]	322.3	0.5
175	Saint Vincent & Grenadines [1,2,3]	318.2	0.5
176	Dominica [1,2,3]	314.7	0.5
177	France [1]	306.8	0.5
178	Mauritius [1,2,3]	306.5	0.5

179	Saint Lucia [1,2,3]	295.8	0.4
180	Saint Kitts & Nevis [1,2,3]	294.7	0.4
181	Barbados [1,2,3]	293.9	0.4
182	Costa Rica [1,3]	277.8	0.3
183	Sweden [1]	255.6	0.2
184	Norway [1]	249.9	0.2
185	Switzerland [1]	215.7	0.0
186	Kiribati [1,2,3]	205.2	0.0

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

GHG Intensity of Economy in 2005
(CAIT, 2010)

(excludes land use change, includes intl. bunkers)
CO_2, CH4, N2O, PFCs, HFCs, SF6

Rank	Country	tCO2e Eq./Mill. Intl $	Index
1	Central African Republic [1,2]	22,691.3	100.0
2	Congo, Dem. Republic	5,851.9	25.1
3	Mongolia	4,553.5	19.3
4	Solomon Islands [1,2]	4,315.5	18.3
5	Turkmenistan [1]	4,043.1	17.1
6	Zambia [2]	3,901.8	16.4
7	Uzbekistan	3,454.0	14.4
8	Korea (North) [1]	2,959.3	12.2
9	Guyana [1,2]	2,923.4	12.1
10	Guinea-Bissau [1,2]	2,702.7	11.1
11	Nauru [1,2]	2,432.3	9.9
12	Angola [2]	2,235.6	9.0
13	Serbia & Montenegro [2]	2,222.8	9.0
14	Sudan [2]	1,989.3	7.9
15	Madagascar [1,2]	1,973.1	7.9
16	Guinea [1,2]	1,970.0	7.8
17	Mali [1,2]	1,912.8	7.6
18	Ukraine	1,882.1	7.5
19	Bolivia	1,824.4	7.2
20	Liberia [1,2]	1,776.9	7.0
21	Mauritania [1,2]	1,773.2	7.0
22	Laos [1]	1,765.3	6.9
23	Mozambique [2]	1,763.8	6.9
24	Ethiopia	1,566.5	6.1
25	Kazakhstan	1,564.5	6.0
26	Nepal	1,559.9	6.0
27	Trinidad & Tobago [2]	1,483.2	5.7
28	Moldova	1,480.8	5.7
29	Eritrea [2]	1,475.7	5.6
30	Tanzania [2]	1,466.7	5.6
31	Chad [1,2]	1,401.6	5.3
32	Myanmar	1,397.8	5.3
33	Congo [1,2]	1,395.2	5.3
34	China	1,367.0	5.2
35	Uruguay	1,346.7	5.1
36	Togo [2]	1,336.5	5.0
37	Iraq*	1,284.5	4.8

38	Azerbaijan	1,283.3	4.8
39	Burkina Faso [1,2]	1,251.8	4.7
40	Senegal	1,246.5	4.6
41	Paraguay [2]	1,229.8	4.6
42	Nigeria	1,226.0	4.5
43	Suriname [1,2]	1,198.0	4.4
44	Uganda [1]	1,183.4	4.4
45	Russian Federation	1,155.9	4.2
46	Cambodia	1,132.9	4.1
47	Bahrain [2]	1,129.4	4.1
48	Cuba [2]	1,122.3	4.1
49	Sierra Leone [1,2]	1,111.8	4.0
50	Kyrgyzstan	1,090.3	3.9
51	South Africa	1,087.1	3.9
52	Nicaragua [2]	1,075.1	3.9
53	Qatar [2]	1,072.8	3.9
54	Zimbabwe [2]	1,070.8	3.8
55	Namibia [1,2]	1,067.4	3.8
56	Benin [2]	1,065.1	3.8
57	Cameroon [2]	1,060.5	3.8
58	Cote d'Ivoire [2]	1,050.0	3.8
59	United Arab Emirates	1,025.2	3.6
60	Burundi [1,2]	1,017.7	3.6
61	Tajikistan	1,014.4	3.6
62	Venezuela	1,014.0	3.6
63	Jordan	1,012.7	3.6
64	Vietnam	1,002.6	3.5
65	Belarus	1,000.5	3.5
66	Oman [2]	969.3	3.4
67	Bulgaria	944.4	3.3
68	Niger [1,2]	937.1	3.3
69	Syria [2]	935.4	3.2
70	Estonia	895.2	3.1
71	Australia	881.5	3.0
72	Bangladesh	874.5	3.0
73	Iran	870.7	3.0
74	Thailand	865.2	2.9
75	Kenya [2]	862.1	2.9
76	Bosnia & Herzegovina [1,2]	841.2	2.8
77	Libya [2]	838.4	2.8
78	Indonesia	831.4	2.8
79	Kuwait	829.6	2.8
80	Ghana [2]	828.4	2.8
81	Gabon [2]	824.0	2.8
82	New Zealand	807.4	2.7
83	Djibouti [1,2]	807.1	2.7
84	Malawi [1,2]	799.6	2.6

85	Saudi Arabia	792.7	2.6
86	Fiji [1,2]	779.1	2.6
87	India	767.5	2.5
88	Bhutan [1,2]	765.1	2.5
89	Argentina	760.6	2.5
90	Papua New Guinea [1,2]	756.5	2.5
91	Gambia [1,2]	754.0	2.4
92	Malaysia [2]	748.7	2.4
93	Singapore	732.4	2.3
94	Macedonia, FYR	718.3	2.3
95	Haiti [2]	717.9	2.3
96	Pakistan	714.4	2.3
97	Poland	712.7	2.3
98	Brunei* [2]	711.1	2.2
99	Palau [1,2]	697.0	2.2
100	Egypt	688.8	2.2
101	Czech Republic	685.4	2.1
102	Jamaica [2]	673.8	2.1
103	Vanuatu [1,2]	664.7	2.0
104	Honduras [2]	664.6	2.0
105	Canada	656.4	2.0
106	Yemen [2]	651.9	2.0
107	Romania	651.6	2.0
108	Brazil	648.4	2.0
109	Lesotho [1,2]	643.2	1.9
110	Niue [1,2]	639.7	1.9
111	Afghanistan [1,2]	627.1	1.9
112	Sao Tome & Principe [1,2]	624.3	1.9
113	Maldives [1,2]	618.8	1.8
114	Belize [1,2]	618.1	1.8
115	Equatorial Guinea [1,2]	615.9	1.8
116	Tonga [1,2]	608.5	1.8
117	Armenia	598.6	1.7
118	Algeria	591.9	1.7
119	Colombia	579.4	1.7
120	Georgia	577.2	1.7
121	Slovakia	576.1	1.6
122	Morocco [2]	572.8	1.6
123	United States of America	570.9	1.6
124	Cyprus [2]	568.7	1.6
125	Philippines	566.1	1.6
126	Swaziland [1,2]	559.3	1.6
127	Korea (South)	555.5	1.6
128	Guatemala [2]	540.1	1.5
129	Rwanda [1,2]	535.4	1.5
130	Botswana [2]	528.8	1.4
131	Tunisia [2]	528.6	1.4

132	Israel	524.3	1.4
133	Lebanon [2]	524.0	1.4
134	Belgium	522.0	1.4
135	Ecuador	511.4	1.4
136	Turkey	508.3	1.3
137	Netherlands	507.4	1.3
138	Mexico	504.9	1.3
139	Seychelles [1,2]	504.3	1.3
140	Greece	499.1	1.3
141	Hungary	491.8	1.3
142	Taiwan* [2]	489.8	1.3
143	Albania	487.0	1.3
144	Dominican Republic [2]	458.2	1.1
145	Comoros [1,2]	456.9	1.1
146	Croatia	455.3	1.1
147	Chile	452.7	1.1
148	Ireland	451.2	1.1
149	Samoa [1,2]	443.6	1.1
150	Finland	439.8	1.0
151	Peru	439.5	1.0
152	Luxembourg	435.4	1.0
153	Slovenia	429.3	1.0
154	Lithuania	418.6	0.9
155	European Union (27)	404.7	0.9
156	Portugal	396.5	0.9
157	Spain	396.3	0.8
158	Latvia	396.1	0.8
159	Germany	387.3	0.8
160	Bahamas [1,2]	383.2	0.8
161	Denmark	378.9	0.8
162	Cape Verde [1,2]	378.6	0.8
163	Cook Islands [1,2]	375.4	0.8
164	Malta [2]	373.8	0.7
165	Sri Lanka [2]	373.6	0.7
166	Iceland	372.9	0.7
167	Grenada [1,2]	363.1	0.7
168	Japan	360.8	0.7
169	Panama [2]	354.5	0.7
170	United Kingdom	353.1	0.7
171	Italy	352.8	0.7
172	Antigua & Barbuda [1,2]	351.5	0.7
173	Austria	340.6	0.6
174	El Salvador [2]	322.3	0.5
175	Saint Vincent & Grenadines [1,2]	318.2	0.5
176	Dominica [1,2]	314.7	0.5
177	France	306.8	0.5
178	Mauritius [1,2]	306.5	0.5

179	Saint Lucia [1,2]	295.8	0.4
180	Saint Kitts & Nevis [1,2]	294.7	0.4
181	Barbados [1,2]	293.9	0.4
182	Costa Rica [2]	277.8	0.3
183	Sweden	255.6	0.2
184	Norway	249.9	0.2
185	Switzerland	215.7	0.0
186	Kiribati [1,2]	205.2	0.0

European Union (27) in Red

* non-parties to the UNFCCC

[1] Data from Land Use Change & Forestry not available.
[2] PFC, HFC & SF6 data not available.
[3] Data from Int'l Bunkers not available.

Abbreviations and Glossary

BAU	business as usual
carbon intensity	GHG emissions per unit GDP
emissions intensity	GHG emissions per unit GDP
energy intensity	GHG emissions per unit GDP
GHG	greenhouse gas
GT	gigaton, one billion tons
LULUCF	land use, land-use change, and forestry
tCO_2e	tonnes (metric tons) CO_2e
UNFCCC	United Nations Framework Convention on Climate Change

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