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Global warming mitigation and renewable energy policy development from the Kyoto Protocol to the Copenhagen Accord—A comment

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ABSTRACT

Global warming is a grave environmental issue that has caught the attention of the globe. Due to the consequences of global warming, UNFCCC has established the Kyoto Protocol and the Copenhagen Accord as measures of combating climate change due to the emission of greenhouse gases. It has been three years since the first commitment period of the Kyoto Protocol and the Copenhagen Accord was just newly established. Therefore, there is a necessity to evaluate the performance of the Kyoto Protocol and to comment upon the Copenhagen Accord in its contributions toward climate change mitigation. Major greenhouse gas (GHG) emitters who are among the Kyoto Protocol ratifying developed nations exhibit the potential to achieve the desired Kyoto pledges through the aid of Clean Development Mechanisms (mainly from using renewable energy), as proposed in the Kyoto Protocol. However, the nullifying effects from non-ratified major emitters like the US and ratified but still developing countries have difficulties in adhering to the Kyoto Protocol. The Copenhagen Accord, on the other hand, is considered to be less ambitious and provides limited financial aid through the Copenhagen Green Climate Fund. The formulation of such a document indicates that modern societies continues to waste time in negotiations that emphasize on individual economic and political advantages, rather than taking into account true global considerations. It raises questions regarding how much time is needed before we decide to fully commit to the effective and collective efforts of climate change mitigation.

Contents

1. Introduction

Global warming has become renowned as one of the gravest environmental issues to catch the attention of the globe in recent decades. It is a consensus view that global warming is an unequivocal result of anthropogenic emission of greenhouse gases (GHG) that remain like a blanket in the atmosphere, thus preventing the reflection of heat back into outer space. Consequently, the average earthly temperature has increased by 0.7 °C since the pre-industrialization period. This diminutive rise of temperature has resulted in climate change that has caused devastation to ecosystems and is affecting sustainable social and economic development. One of the consequences of global warming is the melting of ice in Greenland and the South Pole, and with the thermal expansion of water, a subsequent increase in sea level could take place, which could possibly submerge coastal areas that are often densely populated.

The United Nations Framework Convention on Climate Change (UNFCCC) established the Kyoto Protocol in 1997, deeming it indispensable and necessary to curb the severe damage being caused by global warming. The Kyoto Protocol demarcated that a global effort in climate change mitigation aims to reduce GHG emissions from Annex I countries (developed countries) by 5.2%, with the year 1990 as baseline in the first commitment period of

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2008–2012. The Kyoto Protocol proposes three mechanisms (Clean Development Mechanism (CDM), Joint Implementation, and Emission Trading) to assist the developed ratified nations in achieving their assigned Quantified Emission Reduction Limitation or Reduction Commitment (QELRC) in a more economically feasible way. On the other hand, developing countries have participated in GHG emissions abatement through common but differentiated responsibility principles, as no QELRC is allocated. Primarily, developing countries could participate in CDM projects or formulate new environmental policies in accordance to the objectives of the Kyoto Protocol.

After establishing the Kyoto Protocol, discussions of climate issues by the Conference of Parties (COP) have been taking place annually. In December 2009, The 15th COP drafted the Copenhagen Accord in accordance to post-Kyoto negotiations, with the US and developing countries such as China, India, Brazil, and South Africa having a crucial role in drafting the document. The Copenhagen Accord pledges to limit global temperature increase of 2 ^{o}C to avoid dangerous anthropogenic interference with the climate system. Additionally, the accord embraces a Copenhagen Green Climate Fund that delivers financial support to the most vulnerable developing countries for combating climate change either by mitigation or adaptation efforts.

The Kyoto Protocol is now two years into its enforcement. There is a necessity to analyze its midterm performance. The effectiveness of the Kyoto Protocol should be highlighted in subsequent climate change discussions in attuning its current methodology or distinguishing other approaches for stringent efforts to achieve positive climate change. Additionally, commentaries on the Copenhagen Accord should also be delivered in order to ensure the political will of pursuing poverty eradication and sustainable development in a low emission pathway. This paper, therefore, addresses the analysis of two methods (Kyoto Protocol and Copenhagen Accord) that represent the autonomous initiative of human society for its sustainable future.

2. Midterm analysis of the Kyoto Protocol

The beginning of 2010 meant that the Kyoto Protocol had formally entered the first commitment period for two full years. It is essential for midterm investigation regarding the accomplishments of the nations that have ratified the Kyoto Protocol, in terms of the ultimate goal of GHG emissions reduction to mitigate global warming. Due to the fact that it requires about two years for the data collection to take place before an official GHG inventory can be published, governance reports were updated until 2007. Notwithstanding, GHG emissions could be predicted for analysis purposes and these projections are found to be reliable.

In this paper, the GHG emission inventories of several major emitters will be discussed. Annex I countries of the Kyoto Protocol such as the European Union (EU), Japan, and Russia will be analyzed in terms of their efficiency in achieving their Kyoto pledge. The US and non-Annex I countries such as China and India will be analyzed in terms of their negative influences on goals of the Kyoto Protocol. The EU, as one of the major contributors towards the foundation of the Kyoto Protocol, obligates a GHG reduction of 8% in 2008–2012 [11]. In 2007, the overall GHG emissions from EU-27 were 9.3% below 1990, in which GHG emissions drop from 5564.0 to 5045.1 million tons of CO_2 (without LULUCF – land use, land use change and forestry), indicating their success in achieving their Kyoto commitments [5]. Among the European countries, EU-12 (mainly Eastern Europe) had actually achieved a GHG emission reduction of 25.4% in 2007. Nevertheless, EU-15, especially Spain and Portugal, which account for local emission rise of 52.6% and 36.1%, respectively, offset the total amount of EU reduction [4]. In total, the emission reduction of EU-15 approached 4.3%, which is lower than the 8% target [5]. This shows that EU-15 is not capable of realizing their Kyoto pledge, and the successfulness of EU-27 is merely due to the contribution from EU-12. The emission reduction of 25.4% by EU-12 was, on the other hand, mainly due to the collapse of their economies rather than the effectiveness of their efforts. This illustrates that even though the EU could comply with their Kyoto commitments; a much more ambitious Kyoto target should be adopted for a sustainable future.

Russia is the second largest emitter of the countries that have ratified the Kyoto Protocol (after the EU), and has a commitment to maintain its GHG emissions at base year level [11]. Russian energy related CO_2 emissions in 2007 were 1.6 Gt or 27.3% below its 1990 level (2.2 Gt) [6]. However, this reduction did not imply the accomplishment of the Kyoto Protocol, as the steep reduction of Russian GHG emissions was due to the transition to a market economy. Nevertheless, there was indeed some effort demonstrated by the improvement of the CO_2 intensity index (world 2007=100) between 1990 and 2007 [6]. The decrease of the CO_2 intensity index from 250 to 171 showed that some enhancement in the energy utilization was achieved. Apart from Russia, Japan is listed in Annex I of the Kyoto Protocol and has a GHG emissions reduction commitment of 6% from 1990 [11]. Lau et al. (2009) shows the awareness of the Japanese government in incorporating ideas of sustainable development in the processes of formulating their energy policies. Therefore, Japan emerges as one of the most energy efficient countries with the lowest CO_2 intensity index of 71 (world 2007=100) [6]. Nevertheless, the energy related CO_2 emissions of Japan in 2007 did not decrease compared to 1990 because the emissions rose from 1.1 Gt to 1.2 Gt [6]. From the emission data reported by corresponding countries, it is reasonable to conclude that achieving the goals of the Kyoto Protocol is less likely to occur, even with such a low target.

Since emission reduction difficulties in Annex I countries were expected as the cost of carbon reduction is higher in nations that have already achieved high energy efficiency, fostering CDM as an alternative for cheaper carbon reduction method is crucial for Annex I nations to achieve their pledge. Even though there are three mechanisms proposed by the Kyoto Protocol, CDM emerges as far more important than the other two. Rahman et al. [10] shows that by August 2009, 5316 CDM projects have been submitted to the UNFCCC. Despite 685 projects being rejected or withdrawn, the remaining 4631 projects are expected to generate approximately 2.79 billion certified emission reductions (CERs) [10]. The most popular project types are hydro, wind, biomass energy, and methane avoidance, which account for roughly 70% of the total 4631 CDM projects. Additionally, the CDM is also on track to generate 1100 million CERs annually by 2020. Nevertheless, the 2.79 billion CERs generated are sufficient to aid developed countries in achieving their Kyoto pledges but could likely fail to offset the emissions increase by the US and other developing countries, as discussed in the next section. In addition to providing cheaper alternatives for Annex I countries' Kyoto pledges, the CDM also promotes technology transfer and sustainable development of the host country. Therefore, the CDM or other similar mechanisms are expected to continue beyond the first commitment period as an effective and economically feasible method for achieving carbon reduction.

One of the loopholes of the Kyoto Protocol is the withdrawal of the US from the treaty. The implication of the US leaving this international pact serves to nullify the effort of the nations that have ratified the Kyoto Protocol, since US is the largest emitter among developed countries. The US is required to commit a reduction of 7% if it ratifies the Kyoto Protocol in US Congress [11]. The US federal