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Forest Sink Plan Using a Carbon Offset System

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In April 2005, Canada announced the introduction of new systems that could make the best use of market mechanisms, such as the Climate Fund, the Large Final Emitter System, and the Carbon Offset System, in order to achieve the reductions quota during the first commitment period (2008–2012). The Carbon Offset System has very high potential as a system able to push forward the forest sink policy, as it can help companies obtain credits for the GHG sink through forest sink activities recognized by the Kyoto Protocol (Paragraph 3 and 4, Clause 3). It also enables companies to trade GHG sink credits through the domestic emissions trade market. If the Carbon Offset System, which fully uses market mechanisms, is to be applied in Korea during the second commitment period (2013–2017) when Korea will have to deal with the obligations to reduce GHG emissions, it will be applied mostly to the expansion of the forest sink, through active forest management activities, such as afforestation, reforestation, and deforestation – given Korea has far fewer forest areas than Canada. In this case, it will be possible to increase the efficiency of the system by designing and operating it in a manner suitable for the conditions in Korea, including issuing domestic GHG sink credits to each sink developed through forest management, purchasing the credits, or providing additional subsidies. Forest owners might receive economic incentives through this, and it can also encourage new outside investments, such as forestry investments made by enterprises as part of their social contribution efforts.

INTRODUCTION

At the 3rd Conference of Parties (COP3) of the United Nations Frame Convention on Climate Change (UNFCCC), held in December 1997, the Kyoto Protocol was adopted and the function of the forest as the long-term sink of CO₂, one of the causes of global warming, was discussed. The Kyoto Protocol not only stipulated specific measures to reduce greenhouse gas emissions in advanced nations, but also incorporated the removals and emissions of greenhouse gases generated from land-use changes (Paragraph 3, Clause 3 of the Kyoto Protocol), and forest management (Paragraph 4, Clause 3 of the Kyoto Protocol), including measures regarding new afforestation, reforestation, and deforestation after 1990 into the calculation of carbon emissions and removals in each country, in relation to the forest sink (UN, 1998). The forest, which functions as the sink for CO₂, assumes an important position in implementing the reduction commitments in accordance with the Kyoto Protocol (Paragraph 3 and 4, Clause 3).

The Kyoto Protocol had been jeopardized by the withdrawal of the world's largest greenhouse gas emitter, the United States. However, the protocol was officially made effective on February 16, 2005 with Russia's ratification on November 18, 2004. Korea ratified the protocol in November 2002, despite being classified as a developing nation (Non-Annex I) when the protocol was adopted, thereby not being obliged to any measures dur-

ing the first commitment period (2008–2012). However, there will be many discussions about how to fulfill the duties for reducing emissions levels among major developing nations, including Korea, China, India, and Mexico, in line with measured adopted in the protocol. In particular, Korea will be asked to deal with the huge burden for the reduction of GHG emissions during the second commitment period (2013–2017) (Cho and Kang, 2006), and has been considered as the 10th largest CO₂ emitter among OECD members since 2004 (IEA, 2006).

When the obligation to reduce greenhouse gas emissions during the second commitment period (2013–2017) begins being applied in Korea, it is expected to have an enormous impact on the national economy, as Korea is currently using a great deal of energy. On the other hand, Korea is expecting to eliminate some greenhouse gases through forest management efforts, with 60% of the total forest area – constituting 2/3 of the entire territory – is made up of trees under the age of 30, and still in their growth phases. The percentage of deforestation remains less than 20% of forest growth levels. In this respect, the expansion of the forest sink through continuous forest management is considered a new opportunity for national advancement and for enhancing the earning rates of the forestry industry.

Under these circumstances, it is difficult to secure the efficiency of the policy for the expansion of the forest sink without efficient forest management of the private forests that constitute approximately 70% of the total forest area of Korea (Kim, 2004). Korea will need economic measures to induce the private sector to act other than intensifying financial and technical support for forest management at the national level.

This study examined the characteristics of the car-

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bon offset system, which has enormous potential as a system to push forward the forest sink plan using the market mechanism among many measures implanted around the world to respond to the UNFCCC requirements, and examined the feasibility of introducing the carbon offset system as the forest sink plan in Korea.

METHODS OF STUDY

This study referred to various reports provided by the Canadian government in relation to the UNFCCC, such as the Action Plan on Climate Change, and the report on the Large Final Emitter System and Carbon Offset System, in order to examine the measures of the UNFCCC using market mechanisms. The study examined areas of caution and feasibility in introducing the carbon offset system, despite its potential, while considering differences in natural conditions between Canada and Korea.

CANADA'S RESPONSE TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)

Greenhouse Gas Emission Status

The Canadian government officially ratified the Kyoto Protocol on December 17, 2002, and was bound to reduce its greenhouse gas emissions by 6% from 1990 levels during the first commitment period, as represent-

ed in Table 1 when the protocol was officially put into effect on February 16, 2005.

In April 2006, the Canadian Council of Ministers of the Environment announced the national greenhouse gas emission inventory from 1990 to 2004 (Environment Canada, 2006). According to this inventory, the total GHG emissions in Canada as of 2004 were 758 million CO₂ tons, a 159 million CO₂ ton increase from 1990, the historical base year for the reduction of GHG. This shows that the Canadian government's measures to cope with UNFCCC requirements were unable to control GHG emission increases (Table 2).

The reduction quota for Canada is 6% from the emission levels of 1990, and the Canadian government must work hard to reduce their emissions, as they need to reduce GHG emission levels by approximately 32.5%, (obliged GHG emissions reduction, 6% + increase of GHG emissions from the historical base year, 26.5%), of GHG emissions from their 1990 levels.

Response to the UNFCCC

Countermeasures for Climate Change

After the Kyoto Protocol was adopted, the First Ministers of the Commonwealth, Province, and Quasi-Provincial governments of Canada established the National Climate Change Process (NCCP) in order to prepare for comprehensive measures for the UNFCCC, such as fulfilling the reductions quota, adapting to the impact of climate change, analyzing the costs and bene-

Table 1. Greenhouse Gas Reduction Quotas Around the World

Countries Concerned	Reductions Quota
15 EU nations (Germany, England, France, Italy, the Netherlands, Belgium, Austria, Denmark, Finland, Spain, Greece, Ireland, Luxemburg, Portugal, Sweden), Bulgaria, the Czech Republic, Estonia, Latvia, Lichtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland	-8%
The United States	-7%
Japan, Canada, Hungary, Poland	-6%
Croatia	-5%
Russia, New Zealand, the Ukraine	0%
Norway	+1%
Australia	+8%
Iceland	+10%

Notes: 1. The reference for the reductions quota is the emission levels of 1990.
2. The United States seceded from the Kyoto Protocol in 2001.

Table 2. Canada's GHG Emission Trends by Sector (1990-2004) (Unit: 1,000 CO₂ t)

Classification	1990	1995	2000	2003	2004
Total	599,000	649,000	725,000	754,000	758,000
Energy	475,000	517,000	596,000	622,000	620,000
Industrial processes	53,300	55,000	49,800	50,100	54,300
Solvent & other product use	420	440	460	480	480
Agriculture	45,000	49,000	51,000	53,000	55,000
Waste	25,000	26,000	28,000	29,000	29,000
Land use, land-use change and forestry	-82,000	190,000	-130,000	-11,000	81,000

Notes: National totals exclude all GHGs from the land use, land-use change and forestry sector.

Source: Government of Canada. 2005a Moving Forward on Climate Change: A Plan for Honouring our Kyoto Commitment.

fits of the Kyoto Protocol, and fulfilling the duty of climate change negotiations. The NCCP is an inclusive process of making decisions for climate change with industries, environmental organizations, and experts centering on the Canadian government. As a result of NCCP activities, they established and announced a national strategy for climate change, the “National Strategy on Climate Change” and the “First Climate Change Work Plan,” in October 2001.

In addition to NCCP activities, the Canadian government announced the “Action Plan 2000 on Climate Change” in October 2000 (Government of Canada, 2000), and the “Climate Change Plan for Canada” in November 2002 (Government of Canada, 2002). Later, as the Kyoto Protocol was officially implemented on February 16, 2005, they announced the “Moving Forward on Climate Change – A Plan for Honoring our Kyoto Commitment,” in April 2005 (Government of Canada, 2005a). Moving Forward on Climate Change is the extension of Action Plan 2000 on Climate Change and the Climate Change Plan for Canada, and it is the newest chapter in addressing domestic climate change issues.

Moving Forward on Climate Change advocated the full support of the Kyoto Protocol, and includes the plan to fulfill the reduction quota provided by the protocol, while maintaining active domestic economic growth. The plan called the difference between the annual GHG emissions, estimated based on the prospective value of GHG emissions (Business as Usual: BAU), during the first commitment period (2008–2012) and the 6% of GHG emissions in 1990, the historical base year, assuming that current the economic scale is maintained, the emissions gap, and the Climate Change Plan for Canada estimated at 240 million CO₂ tons. However, Moving Forward on Climate Change changed the emissions gap to 270 million CO₂ tons, and the gap became larger. Considering the trend of GHG emissions, which illustrated a continuous increase since 1990 as shown in Table 2, Canada is in a very difficult position in terms of fulfilling their reductions quota.

Moving Forward on Climate Change

The Moving Forward on Climate Change report included some new systems to cope with the UNFCCC, and they are expected to fulfill their reductions quota, the emissions gap of 270 million CO₂ tons of GHG.

Table 3. Moving forward on Climate Change

Initiative	Cost (until 2012)	Reduction of GHFs (Mt)
Climate Fund	\$5 billion	75–115 Mt
Partnership Fund	\$2–3 billion	55–85 Mt
Large Final Emitter System		45 Mt
Auto Industry (MOU)		5.3 Mt
Renewable Energy	\$1 billion	15 Mt
One-Tonne Challenge	\$120 million	5 Mt
Greening Government		1 Mt
Existing Programs	\$2.8 billion	10 Mt
Agriculture and Forests (Sink)		10–30 Mt

Source: Government of Canada. 2005a Moving Forward on Climate Change: A Plan for Honouring our Kyoto Commitment.

In relation to Moving Forward on Climate Change, this paragraph will examine the new systems adopted by the report, such as the Climate Fund, the Large Final Emitter System (LFES), and the Carbon Offset System (COS) (Table. 3).

Climate Fund

The Moving Forward on Climate Change changed the title of the Clean Fund to the Climate Fund. As shown in Table 3, the Climate Fund outlines the financial resources contributed by the Canadian government for fulfilling the reductions quota. The Moving Forward on Climate Change report appropriated a \$1 billion budget, and they are intending to place an additional \$4–5 billion until 2012, when the first commitment period (2008–2012) will end. The Canadian government is expecting to fulfill the reductions quota, 75–115 million CO₂ tons of GHG, during the first commitment period (2008–2012).

The Climate Fund, which will be examined in the next paragraph, outlines the financial resources contributed by the Canadian government, and secured for purchasing the GHG emissions credit generated from COS, which uses market mechanisms. Also, the Climate Fund not only considers the domestic GHG emissions credit system, but also overseas credit systems using Kyoto Mechanisms, such as CDM (Clean Development Mechanism) and JI (Joint Implementation).

The Canada Emission Reduction Incentives Agency, (the CERIA), reviews and determines how much of its GHG emissions credit, and in which areas, will be purchased concerning both domestic and foreign credits under the supervision of the Ministers of the Environment. They have already secured \$1 billion for the Climate Fund, and plan to determine the size of the additional budget according to the GHG emissions reduction status in Canada, as well as the supply and the price of the GHG emissions credits both inside and outside of the country (Government of Canada, 2005a).

Greenhouse Gas Emissions Quota Scheme for Large Final Emitters (LFES)

In Canada, the Large Final Emitters system refers to strategic industries, the petroleum and gas industries, and businesses in the coal and manufacturing sector. The large final emitters of Canada produce roughly 50% of the total emissions, and there are around 700 large final emitters. Among them, about 80–90 companies produce 85% of the total emissions produced by all large final emitters. The UNFCCC measures for large final emitters are quite important for Canada in fulfilling their reductions quota. How well they control the GHG emissions of the large final emitters will determine the success or failure of Moving Forward on Climate Change.

LFES is a system that sets the reductions quota for each business sector, based on the source unit, (GHG emission/unit production), and imposes the GHG emissions reduction quota for each large final emitter (Figure 1). Large final emitter must purchase surplus emissions from other large final emitters in the domestic emissions trade market, which will be introduced in the future, or purchase domestic GHG emissions credits in order to

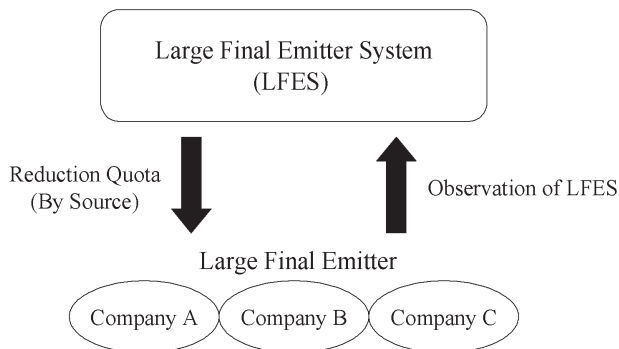


Fig. 1. Conceptual Map of the LFES.

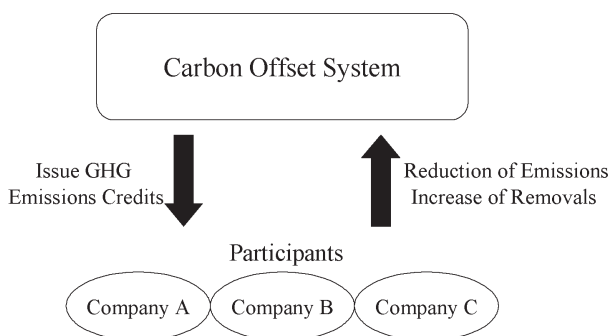


Fig. 2. Conceptual Map of a Carbon Offset System.

achieve the reductions quota. They may also purchase GHG emissions credits from abroad, by using Kyoto Mechanisms, such as CDM and JI, to achieve the reductions quota given to them. LFES is designed to minimize the cost consumed in fulfilling the reductions quota by making the best use of the market mechanism (Government of Canada, 2005b). However, the Moving Forward on Climate Change report reduced the reductions quota for large final emitters from 55 million CO₂ tons in 2002 to 39 million CO₂ tons, as large final emitters strongly resisted the system.

Carbon Offset System (COS)

The COS gives greenhouse gas emissions credits to enable the trade in greenhouse emissions reductions quotas, (or greenhouse gas absorption increases), that a company can obtain through activities such as new for-estation and reforestation in the forestry field (Fig. 2) (Government of Canada, 2005c). The plan affects the absorption of greenhouse gas emissions for a fixed period of time. The credits obtained can be used by companies to meet their greenhouse emissions reductions quotas or for other purposes.

This system calculates the greenhouse gas emissions reductions quota, (or greenhouse gas absorption increases), that a company has obtained in executing a project, following government or managing bureau approval. The company can then obtain greenhouse gas emissions credits when the Canadian government approves of the calculation results. In other words, it undergoes a proc-

ess of examining the propriety of the project → verifying greenhouse gas emissions reductions → issuing greenhouse gas emissions credits → trading greenhouse gas emissions credits.

Companies can obtain financial incentives by executing greenhouse gas emissions related projects, as they can sell any greenhouse gas emissions credits they obtained through the domestic emissions trading market, which will be introduced in the future, to the Climate Fund established by other companies, or to the government.

The carbon offset system uses market mechanisms to minimize the expenses required for reducing GHG emissions and its impact on related sectors. In other words, it promotes the reduction of GHG emissions in the country by providing economic incentives to companies with relatively low marginal abatement costs, so that they might reduce their GHG emissions.

The companies using the COS can calculate the GHG reductions, (or the increase of GHG removals), that they have achieved by executing projects based on the predetermined OSQP, (Offset System Quantification Protocol), or determine a new calculation method appropriate for the respective project. OSQP has been reviewed in areas with high feasibility and importance in relation to Canada's GHG reductions quota, such as Landfill Gas Capture and Destruction, Reduction in Methane Emissions in Agriculture, Soil Management, and Afforestation (Government of Canada, 2005c).

The Domestic Emissions Trading System

This study briefly examined the measures of the Canadian government for implementing the UNFCCC, centering on the Climate Fund, the LFES, and the COS in their Moving Forward on Climate Change report. These three systems can generate supply or demand of GHG emissions credits in the market, and are quite closely related with the domestic emissions right trade market, which is soon to be introduced. When a company that has obtained GHG emissions credits through the COS sells its emissions credits in the domestic market, large final emitters, the GHG emissions reduction quotas of which are determined by the LFES or the Canadian government, can purchase these GHG emissions credits. In the Moving Forward on Climate Change plan, the demand for GHG emissions credits can expand in consideration of the fact that there are some large emitters unable to meet the reductions quota in relation to their financial status, although the total GHG reduction quota for the LFES (39 million CO₂ tons) is 29.1% less than the Climate Change Plan for Canada.

POTENTIAL IN APPLYING A CARBON OFFSET SYSTEM AS A FOREST SINK PLAN

Application of a Carbon Offset System

As one of the major applications of the COS, the Canadian government cited the case of afforestation, which is regarded as creating a forest sink under Paragraph 3 (Afforestation, Reforestation, and Deforestation), Clause 3 of the Kyoto Protocol, in addi-

tion to the recognition of the 12 million tons of forest sinks each year from forest management practices, (Paragraph 4, Clause 3 of the Kyoto Protocol), according to the Marrakesh Accords, which determined the specific rules of implementation for the protocol at the 7th Conference of Parties (COP7) in 2001 (UNFCCC, 2001).

A COS can minimize social expenses created in achieving the GHG reductions quota, and create new business opportunities using the market mechanism. The participants of the system can obtain GHG emissions credits by executing various activities for forest sink recognition, such as afforestation and reforestation. Furthermore, they can sell GHG sink credits through the domestic emissions trade market, and obtain new economic incentives. The Canadian government established the Climate Fund and is planning to purchase domestic emissions credits, (e.g. GHG Forest Sink Credits), expecting to reduce the cost to GHG emitters. However, it does have the disadvantage where the GHG emissions credits obtained through the COS are only valid inside the country in question.

On the other hand, it is necessary to maintain reasonable OSQP for calculating GHG removals first, in order to execute forest sink programs efficiently. The Canadian government is expecting to accumulate knowledge about forest sink measurement through the maintenance of reasonable OSQP, and is also expecting to reduce the costs to participants and program operators in executing the program.

Potential in Applying a COS as a Forest Sink Plan in Korea

There are many differences between Canada and Korea in terms of geography, the economy, and society. The following describes the necessary cautions and feasibility issues in applying a COS to Korea as a forest sink program, considering such differences.

The total forest area of Korea was 6,394,000 ha as of 2005, constituting 64.2% of the entire land area (9,965,000 ha). In this area, the size of the private forests is 4,420,000 ha, representing 69.2% of the entire forest area. Most of these are owned by small forest owners (as of 2005, one private forest owner owned 2.3 ha of forest area) (Korea Forest Service, 2006). For this reason, the economic incentives small forest owners can obtain from executing a forest sink program individually are very limited, unlike those available in Canada, (forest area: 402.1 million ha, ownership: 77% owned by Provinces, 16% owned by the Commonwealth, and 7% owned privately). Furthermore, the possibility of executing a forest sink project is also very low. The administrative costs used for issuing and managing a forest sink credit system is enormous, as the scale of ownership is very small. Therefore, it is necessary to have a system that encourages consortiums to gather small forest owners into certain group sizes, and execute the forest sink program as stipulated in Paragraphs 3 and 4 of Clause 3 of the Kyoto Protocol in any forest area greater than a certain level, in order to introduce a COS in the future.

On the other hand, the land area and the forest area of Korea is very small compared with Canada, (national land area: 979.1 million ha, forest area: 402.1 million ha) (Natural Resources Canada, 2006), and Korea has limited plain areas compared to forests. Korea has successfully completed the Forestry Conservation and Afforestation plan during the First 10 Year Term, as well as the Forestry Conservation and Afforestation plan during the Second 10 Year Term (1973–1987), and the Third Mountain Resource Development Plan (1988–1997). There are only very limited areas in Korea that could apply afforestation and reforestation sufficiently to obtain recognition as a forest sink according to Paragraph 3, Clause 3 of the Kyoto Protocol. For this reason, if Korea is going to introduce a COS, it must concentrate its resources into expanding forest sinks through the processes outlined in Forest Management (Paragraph 4, Clause 3 of the Kyoto Protocol).

In general, the forest sink program through forest management yields less forest sink credits than afforestation, because the entire forest area subjected to afforestation is included in the calculation of the forest sink, and because credits are issued based on the accumulation of CO₂, whereas only existing forest areas are considered for forest management, and only the growth of the forest included in the calculation of forest sink credits. This leaves a very limited chance for the issuing of forest sink credits to work effectively.

Therefore, Korea will need a unique system, such as issuing half of the credit values for removals obtained by managing existing forests and providing additional subsidies or economic incentives to participants according to the quantity of removals. The system would need to include ownership issues regarding forest sinks, and a method to confirm and verify forest sink areas.

The Climate Fund established by the Canadian government is expected to play an important role in the domestic emissions trade market as a purchaser of domestic GHG emissions credits. Korea will also need to develop such a system in order to push forward the forest sink expansion program. Especially, it is necessary to secure financial resources, (e.g. a Climate Fund), and develop a system at the government level to purchase GHG removals credits specialized for forest sink measures, as it is difficult to secure the efficiency of forest sink expansion programs in the future without deploying efficient management of private forests, which constitute around 70% of the total forest area in Korea.

CONCLUSIONS

As the Kyoto Protocol was officially implemented in February 16, 2005, advanced nations of the world were obliged to reduce their GHG emissions by 5.2% on average, from the 1990 emissions levels, during the first commitment period (2008–2012). Accordingly, advanced nations are preparing various measures to cope with the UNFCCC. Under these circumstances, Canada is obliged to reduce at least 32.5% of its emissions from 1990 levels during the first commitment period (2008–2012), as its

emissions levels as of 2004 increased by 26.5% from those of 1990. Accordingly, the Canadian government introduced new systems that utilize market mechanisms, such as the Climate Fund, the LFES, and a COS in 2005 to fulfill their reductions quota for GHG emissions. Among these measures, the COS has great potential as a system to push forward the forest sink program. Participants of the program can obtain GHG sink credits through afforestation, trade the credits through the domestic emissions trade market, and obtain economic incentives.

If a COS is to be applied in Korea, it will be applied mostly to the expansion of forest sinks through active forest management, which is stipulated in Paragraph 4 of Clause 3 of the protocol, as the area for afforestation, reforestation, and deforestation is quite limited in Korea, unlike Canada. In relation to the management of a COS, it will be possible to increase the efficiency of the system by designing and operating it suitably for the conditions found in Korea, such as issuing domestic GHG sink credits to each sink developed through forest management, purchasing credits through the fund, (Climate Fund), established by the government, or providing additional subsidies. Therefore, it is necessary to examine the introduction of new systems using market mechanisms, such as a COS, so as to be prepared for the ensuing obligation to reduce emissions during the second commitment period (2013–2017).

The forest policy of Korea has been to encourage the maintenance of artificial forest resources and forest management activities through continuous production activities in the forestry industry, by providing forest owners with public subsidies for various forestry business expenses, accompanied with subsidies for afforestation. However, the owners of small forest areas have neither commenced or given up on forest management, as they were without any economic incentives to operate forest management practices. Under these circumstances, it will be possible to provide new economic incentives to forest owners and this will create opportunities to encourage new investments from outside if new systems using market mechanisms are introduced in Korea.

Companies are making various social contributions in many sectors of society, as society begins to develop a positive attitude toward social contributions made by profit-making organizations. Also, recent revisions in the corporate tax system regarding forest investments made by a company as a contribution to the public interest are noted (Clause 24 of the Corporate Tax Law) (Korea Ministry of Government Legislation, 2007). The introduction of systems, such as a COS, is expected to encourage investments from enterprises in forestry.

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