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Study on the Analysis of Forest Sink Policy against Climate Change in Major Countries

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The analysis of forest sink policies against climate change in major advanced nations including EU, Japan, New Zealand, the USA, and Australia showed that EU, the USA, Australia, New Zealand and so forth pushed forward with the forest sink policies by laying emphasis on the change of land usage such as afforestation and reforestation while Japan is focusing on forest management activities. This tendency is attributed to the fact that Japan does not have much land for additional new forestation or reforestation similar to Korea. Also, forest sink policies of major advanced countries excluding EU which does not approve the use of emission rights generated through forest sink projects are pushing forward with forest sink expansion policies in connection with the forest related carbon offset projects. Under the circumstances, Korea needs to participate in the emission trading scheme in the future through carbon offset project to realize sustainable forest management and expand forest sink.

INTRODUCTION

Chances that Korea, an OECD member and the world's 10th largest emitter of greenhouse gas, will have to shoulder reduction commitment in any way possible in the Post–2012 climate change response system in the future are growing due to the influence of the Bali Roadmap agreed through the climate change convention COP13 and COP/MOP–3 held in Bali, Indonesia in December 2007. Such a reduction commitment is very likely to become a great risk to Korean economy which depends on import for 97% of the energy consumption, has been making export–led growth, and has energy–intensive industrial structure, and therefore Korea desperately needs to develop and implement effective policies to cope with climate change by sector in order to turn such risks into the opportunities for long–term national development (Yim, 2008).

In the circumstances, the forest sector acknowledges the afforestation, reforestation, and conversion of forest (Article 3.3 of the Kyoto Protocol) and forest management (Article 3.4 of the Kyoto Protocol) accompanying the changes in land use as the greenhouse gas reducing activities to relieve climate change under the Kyoto Protocol. In other words, the forest which functions as the long–term sink for carbon dioxide plays an important role in fulfilling greenhouse reduction commitment allocated to each country in accordance with Article 3.3 and 3.4 of the Kyoto Protocol. Japan set the goal of reducing its greenhouse gas emission by 6% compared with 1990 and 3.9% in 6% through the forest sector (Ministry of Agriculture, Forestry and Fisheries of Japan, 2009).

On the other hand, the Marrakesh Accords (COP–7, Morocco) were adopted in 2001, and the detailed rules and procedures were completed for the fulfillment of Land Use, Land Use Change and Forestry (LULUCF) as well as the Kyoto Mechanism adopted by the Kyoto Protocol. However, LULUCF is limited to the first commitment period (2008~2012). The negotiation for determining the reduction goal and reduction plan of advanced nations (Annex I: 38 countries) which will be applied during the second commitment period of the Kyoto Protocol in the future is currently in process and there are also continuous discussions on the role of the forest sector.

The role of the forest sector in future climate change convention for Post–2012 period is not determined as yet, but it will be possible to suggest plans to effectively implement forest sink policies to cope with the greenhouse gas reduction commitment for Korea by analyzing the forest sink policies that major advanced nations established to cope with the Kyoto Protocol during the first commitment period.

MATERIALS AND METHODS

This study analyzed forest sink related policies such as the afforestation, reforestation, and deforestation (Article 3.3 of the Kyoto Protocol) and forest management (Article 3.4 of the Kyoto Protocol) that are acknowledged as the greenhouse gas reducing activities to relieve climate change under the Kyoto Protocol centering on major advanced nations such as EU, Japan, New Zealand, the USA, and Australia through related literatures and derived implications. Also, this study suggested plans to effectively implement forest sink policies to cope with the greenhouse gas reduction commitment that Korea is expected to shoulder for Post–2012 period.

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RESULTS AND DISCUSSIONS

Forest Policies and Measures for Climate Changes in Major Countries

EU

EU's policy and measure in forest sector to cope with climate change are implemented with emphasis on Article 3.3 (Afforestation/Reforestation) and 3.4 (Forest Management) approved by the Kyoto Protocol and the fossil fuel replacement policy using wood biomass.

Major afforestation (afforestation/reforestation) is carried out in the area damaged by forest fire including the countries in the shore of the Mediterranean such as Spain and Portugal. For the forestation in the forest fire struck area, the baseline becomes the amount of greenhouse gas absorbed during the commitment period in case the forest fire struck area is renewed by natural agency and additionality refers to the amount of greenhouse gas absorbed during the commitment period in case the forest fire struck area is renewed artificially excluding the baseline greenhouse gas absorption.

For forest management, EU chose the policy of enhancing forest carbon stock by switching logging method to decrease full logging area and increase selective logging area. In other words, switching full logging to selective logging for potentially 30 million ha out of 96.7 million ha of forest in 15 EU states will increase greenhouse gas absorption by 180 tCO_2/ha and decrease wood production. One of EU's major climate change response policies in forest sector in addition to afforestation and forest management activities is the fossil fuel replacement promotion policy.

EU established the objective of restricting the use of fossil fuel and expanding the use of bio energy and decided to increase the ratio of bio energy in total energy consumption from 6% in 1998 up to 12% as of 2010. Some EU states introduced carbon tax to restrict the use of fossil fuels to play an important role in reducing CO_2 emission. In particular, Sweden increased the use of biomass fuel in the district heating system. Under the said objective, EU is promoting the wood utilization policy which uses biomass which is the product of forest management as bio fuel and is also planning to promote the afforestation policy targeting fast–growing forest for short–rotation cycle in order to maximize biomass.

Unlike other countries that implement emission trading schemes, EU excludes the use of emission rights produced from forest sink project. The reason EU–ETS which constitutes the largest part of the emission trading scheme and leads the market excluded forest sink project is the incomplete solution for permanence and leakage and high implementation cost (European Parliament and the Council of EU, 2004; Han and Youn, 2009).

Japan

Japan is carrying out forest sink policies to cope with climate change mainly based on Article 3.4 (Forest Management Activity) of the Kyoto Protocol.

The Kyoto Protocol was effectuated as of February 2005, and Japan must reduce greenhouse gas emission by 6% compared with the base year (1990) during the first commitment period (2008~2012). To fulfill this reduction goal, Japan established "Kyoto Protocol Goal Fulfillment Plan" in April 2005 and has been promoting a variety of policies and measures.

The estimation of greenhouse gas emission based on recent statistical data shows that Japan will fall short of the reduction goal of 6% by 0.8~1.8% with current policy and measures, however, exceed the goal with additional measures in each sector on top of current policy and measures which were being carried out as of March 2008 that they revised the "Kyoto Protocol Goal Fulfillment Plan" fully to push forward with global warming prevention measures (Ministry of Agriculture, Forestry and Fisheries of Japan, 2009).

The "Kyoto Protocol Goal Fulfillment Plan" suggests goals for greenhouse gas emission restriction and absorption in each sector. Concerning the goal of the forest sector, it was predicted that the goal of forest sink, 13 million t–C (approximately 3.9% of greenhouse gas emission of the base year) will be secured in case the goal for the display of the multilateral functions of the forest and the supply and use of forestry products suggested in the Forest and Forestry Master Plan resolved at the Cabinet Meeting in September 2006 based on the Framework Act on Forest and Forestry, and the 10–year measure for forest sink for the prevention of global warming was established based on this. The 10–year measure includes five goals such as ① Organization of wholesome forest, ② Appropriate management and preservation of protection forest, ③ Promotion of timber and wood biomass, ④ Promotion of forestation through national participation,

Table 1. Major Contents of EU's Forest Sink Policy

Sink Policy	Major Contents
3.3 (Afforestation / Reforestation)	– Afforestation of areas damaged by forest fire in countries on the shores of the Mediterranean such as Spain and Portugal
3.4 (Forest Management)	– Change of logging method (Reduce full logging → expand selective logging) – If full logging is switched to selective logging for 30 million ha of forest, the estimated increase of greenhouse gas absorption is 180 tCO_2/ha
Expand Utilization of Wood Biomass	– Expand the use of bio energy – Promote fast–growing forest for short–rotation cycle to utilize wood biomass as much as possible

Table 2. Additional Measures and Policies for Fulfilling Goals of Kyoto Protocol

Goal	Contents
Greenhouse Gas Emission Measures and Policies	– Promotion of independent action plan – Enhancement of energy efficiency of houses and buildings – Promotion of energy efficiency measures in factories and business establishments – Promotion of greenhouse gas emission reduction measures by small and medium companies – Promotion of measures for agriculture and forestry, waterworks and sewage, and traffic and logistics – Promotion of measures for urban afforestation and for 3 gases such as waste and substitute fron gas – Promotion of new and renewable energy measures
Greenhouse Gas Sink Measures and Policies	– Large scale forest organization such as thinning – Promote National Campaign for Culturing Beautiful Forest
Cross–sectional Policy	– Calculation, report, and announcement system for greenhouse gas emission – Promotion of national campaign
Programs to be reviewed immediately	– Domestic emission trading scheme – Environment tax – Introduction of summer time

Table 3. Major Contents of the Forest Sink Policy including Additional Sinks

Forest Sink Policy	Major Contents
Wholesome Forest Organization	– Establishment of Special Act on the Promotion of Forest Thinning, Etc. in 2008: Pushed forward with forest organization such as additional forest thinning – Intensified forest organization on site scale, promotion of forest thinning, induced long–rotation, multiple–layered forest, secured and trained manpower
Appropriate Forest Management and Preservation	– Appropriate forest preservation and management through the regulation for conversion and logging of protection forest, systematic designation of protection forest and preservation forest system – Promotion of measures against forest disasters such as landslide, insect damage, and forest fire – Expansion of natural parks and natural environment preservation area and intensification of preservation management in the same area
Forestation through National Participation	– Promotion of forestation activity by large organizations such as companies – Promotion of technological enhancement such as forest volunteer and education for forest environment – Promotion of education for forest environment – Promotion of protection project for animals and plants including forest in national parks
Use of Wood and Wood Biomass	– Preparation of Act on Promotion of Timber Use in Public Building (draft) in March 2010 – Production through the connection between producing center and consumers, distribution, and organization of processing system – Establish the system for efficient collection and transportation of scrap timber

Note: Act on Promotion of Timber Use in Public Building (draft) provides the basic policy for the promotion of the use of domestically produced timber and other timbers in the construction of public buildings specified the Minister of Agriculture and the Minister of Highway and Traffic in order to promote sustainable and wholesome development of forestry through the promotion of timber use.

and ⑤ Intensification of the absorption report and verification system.

However, the estimation of forest sink based on recent data showed that current forest organization scheme at current rate will fall short of the forest sink target by 13 million t–C ~ 1.1 million t–C. To secure the shortage of forest sink it is necessary to promote additional measures to absorb 200,000 t–C each year. Accordingly, Japanese government is promoting various supportive measures to accelerate forest organization as

a part of the 10–year measure for forest sink for the prevention of global warming and also established the "Special Act on the Promotion of Forest Thinning, Etc." in 2008 to absorb 200,000 t–C each year additionally. "Special Act on the Promotion of Forest Thinning, Etc." provides measures such as the exception of local bond and provision of subsidy in order to promote intensive thinning and so forth during the first commitment period (2008~2012) of the Kyoto Protocol and it is also called "Thinning Act." (Japan Forestry Agency, 2009)

Also the "National Campaign for Culturing Beautiful Forest" targeting the thinning of 550,000 ha of forest each year for 6 years from 2007 to 2012, total 3.3 million ha throughout the country through the understanding and cooperation of the people. "National Campaign for Culturing Beautiful Forest" is mainly comprised of the public relations to forest land owners on forest organization, the establishment of extensive national participation plan, and the expansion of the use of domestic timber.

On the other hand, Japan has been implementing the carbon offset project using market mechanism, J–VER (Japan Verified Emission Reduction), from October 2008 in order to aid the fulfillment of the reduction commitment by the Kyoto Protocol. Under this system, the forest sector is indirectly supporting forest sink measures as the greenhouse gas reduction by forest management, forestation, replacement of fossil fuel through the use of wood biomass are acknowledged as carbon offset projects (Certification Center on Climate Change, Japan, 2010).

New Zealand

New Zealand is one of Annex I with the reduction commitment proposed by the Kyoto Protocol. However, New Zealand excludes emission rights obtained through forest management during the first commitment period from the calculation of total emission and is implementing their forest sink policies centering on Article 3.3 of the Kyoto Protocol which is afforestation, reforestation, and forest conversion. Typical sink policies include Emission Trading Scheme, Afforestation Grant Scheme, and Permanent Forest Carbon Stock Initiative (Ministry for Environment, 2007; 2008).

New Zealand's Emission Trading Scheme (ETS) is the cap and trade system introduced from the forest sector in 2008 by Climate Change Response Act established in 2002. They are planning to include all sectors other than the forest sector as of 2015 and the forest sector was directly included in the emission trading scheme for the first time in the world and introducing the scheme to the forest sector before any other sectors was also unprecedented (Ministry for Agriculture and Forestry, 2008)

The Ministry of Environment established the emission trading scheme as the competent authorities for Climate Change Response Act, and the ministry is also in charge of the emission rights distribution plan and the development of related regulations. The Ministry of Economic Development manages the system and operates New Zealand Emission Unit Register (NZEUR). However, the forest sector is managed by the Ministry of Agriculture and Forestry.

Since currently forest plays a very important role in fulfilling the goal of the climate change convention as the major carbon stock and also has the potential of expanding the forest in the future, the forest sector became the first sector to participate in the emission trading scheme. Another reason the emission trading scheme was introduced to the forest sector is to prevent current deforestation trend. As said, New Zealand introduced the emission trading scheme to expand sink through afforestation and reforestation and prevent deforestation.

Forest is divided into post–1989 forest land and pre–1990 forest land and the owners of each type of forest land are encouraged to participate in the scheme (New Zealand Government, 2010). Post–1989 forest land refers to the land which was not the forest land as of December 31, 1989 but converted into the forest land after December 31, 1989 through the plantation of foreign tree species and or the growth of aboriginal tree species. Post–1990 forest land refers to the land which has been forest land as of December 31, 1989 and is still forest land as of December 31, 2007 and is mainly composed of foreign tree species.

Since 1989, the owners of forest land participated in the system voluntarily. The participant is given the emission rights named NZUs from the government for the increase of carbon sunk to the forest due to the growth of his or her forest since January 1, 2008. However, if the forest's carbon sink capacity reduces due to logging, conversion of usage, and forest fire compared to the capacity reported previously, then he or she must return the emission rights to the government for the reduced capacity.

The owner of 50 ha or greater area of pre–1990 forest land must participate in the scheme obligatorily in case he or she is converting the forest he or she owns at the point when the conversion of the forest begins. To prevent the conversion of pre–1990 forest land, the government distributed the emission rights (NZUs) to forest land owners at no cost and retrieves the emission in case the usage is converted. A total of 55 million NZUs will be distributed, and approximately 38%, 21 million NZUs, will be given during the first commitment period between 2008 and 2012 and approximately 62%, 34 million NZUs, will be given after 2012. The owner of pre–1990 forest land is entitled to a fixed amount of NZUs per unit area for the corresponding forest land depending on the year of purchase and he or she can keep or sell these NZUs. If the owner of 50 ha or greater area of pre–1990 forest land is converting 2 ha or more of his or her forest land between January 1, 2008 and December 31, 2012 (first commitment period), the owner must return NZUs to the government as much as the emission caused by the conversion of forest.

Afforestation Grant Scheme (AGS) provides subsidy for the afforestation of the land which is treeless as of December 31, 1989. This type of forest land is called post–1989 forest land. The reason for introducing Afforestation Grant Scheme is to recommend the devel-

Table 4. Advantage and Disadvantage of the Policy for Maintaining and Expanding the Sink in the Position of Land Owner

	Advantage	Disadvantage
Emission Trading System	– Secure credit (NZUs) for the carbon absorbed after 2008	– In case the carbon stock decreases under the previously reported carbon stock level due to logging and disasters, the owner must return NZUs equaling the decrement
Afforestation Support System	– Receives subsidy for forestation through 10–year contract – Possible to gain income by selling timber – After 10 years, the owner can covert forest without any restriction or join emission trading scheme or permanent forest sink initiative	– Government owns the credit for the carbon stored in the forest for 10 years
Permanent Forest Sink Initiative	– Gain carbon credits specified in the Kyoto Protocol (AAUs) and trade them in the international carbon market – Limited logging within the extent of maintaining uniform scaling	– Clean cutting prohibited during contract period – After at least 50 years of contract period is expired, the owner must return the credit he or she has received

opment of the forest that complies with the Kyoto Protocol in order to absorb the greenhouse gas in air and also provide various environmental conveniences such as the prevention of erosion, the control of water, and the promotion of biodiversity.

Afforestation Grant Scheme is often used as the less–costly alternative for the emission trading scheme for the owners of small forest land and it can be applied to both foreign specie forest and aboriginal specie forest. The land owner can receive the subsidy for the expenses used for afforestation after concluding the 10–year contract with the Forest Ministry. During the contract period, the land owner shall shoulder all responsibilities for protecting the forest against harms or devastation of the forest and exploiting or clear cutting is prohibited. Also, the government secures the carbon credit produced from the forest in return for the provision of the subsidy.

Afforestation project covering at least 5ha can join this scheme, and the forest subsidized by this scheme cannot simultaneously participate in the emission trading scheme or the Permanent Forest Sink Initiative which will be explained later. Once the contract ends, the owner can dispose the forest at his or her will or participate in the emission trading scheme or cut and sell the timber.

Permanent Forest Sink Initiative (PFSI) is one of the government's climate change initiative packages introduced to promote the development of the forest that complies with the Kyoto Protocol as one of the means to absorb greenhouse gas. The land owner can participate in this initiative through the contract with the government.

The land owner participating in this initiative will receive the carbon credit called AAUs per 1 ton of carbon absorbed by the forest developed but must return AAUs when the carbon stock decreases. The land owner engaging in the afforestation or reforestation of the land which was not a forest after January 1, 1990 and the investor investing to Permanent Forest Sink Initiative to secure AAUs can participate in this initiative.

The contract period is at least 50 years and the clean cutting is prohibited for first 99 years, however, is allowed within the extent that the uniform scaling is maintained based on the crown closure. The owner has to shoulder responsibilities for the decrease of carbon stock due to clean cutting or other disasters, but not exceeding the level of AAUs that he or she received in the corresponding forest area. After 50 years, when the contract terminates, the owner must return the carbon credit he or she has received.

The forest land that was not forest as of January 1, 1990, covering at least 1ha of area can participate in this initiative and the participant cannot simultaneously join emission trading scheme and Afforestation Grant Scheme.

As discussed, New Zealand is operating a variety of systems to expand and maintain forest sinks, but land owners are not obligated to participate in one of these schemes. Land owners who are not participating in any of these schemes can develop forest with the species they want and where they want under their full responsibilities and also log them whenever they want. However, they will have to pay for all expenses required for forestation and they will not be entitled to the credit (NZUs) for the carbon their forest absorbs. There are differences between schemes in terms of whether the forestation expenses are paid, whether the income from logging is secured, and where the carbon credit produced by the forest belongs to, and these provide a variety of choices to land owners in developing forest in their lands. The advantages and disadvantages of each system are shown in Table 4.

USA

The USA withdrew from the Kyoto Protocol, however, is pushing forward with forest sink policies and measures to cope with climate change using carbon offset projects within emission trading scheme.

The USA established emission trading schemes on the level of federal government and on the level of state government and is coping with Article 3.3 (Afforestation/Reforestation) and 3.4 (Forest Management) of the Kyoto Protocol through the forest related carbon offset project.

On federal government level, the American Clean Energy and Security Act (Waxman–Markey Bill) which includes national emission trading scheme passed the House of Representatives on June 26, 2009. This bill represents the aggressive attitude of the Obama Administration toward climate change. A number of climate change related bills suggested at least 50% of reduction from 1990 as of 2050 but this bill suggested the national greenhouse gas reduction goal up to 3% as of 2012, 17% as of 2020, and 83% as of 2050 compared with the greenhouse gas level of 2005. This bill includes articles concerned with the supply of renewable energy, the enhancement of energy efficiency, and cap and trade system. Like other climate change bills, it indicates carbon offset as the greenhouse gas reduction plan and it also allows international trade of carbon offset credit.

The bill is comprised of following 5 chapters containing articles concerned with forest carbon offset related with forest and forestry. In particular, it considers the carbon sink project in the forest sector as a major greenhouse gas reducing measure as much as it allotted the whole chapter on carbon offset.

[American Clean Energy and Security Act]
Chapter 1 Clean Energy
Chapter 2 Energy Efficiency
Chapter 3 Reducing Global Warming Pollution
Chapter 4 Transitioning to Clean Energy
Chapter 5 Agriculture and Forestry Related Offsets

According to the American Clean Energy and Security Act, the fundamental supervisor of the forest carbon offset project is the Environment Protection Agency, but the Secretary of Agriculture is in charge is domestic agriculture and forest related offsets. The Environment Protection Agency governs the establishment of carbon offset credit related regulations and the selection of projects for carbon offset program and their methodologies, but the Department of Agriculture Advisory Committee on Greenhouse Gas Emission Reduction and Isolation comprised of 9 officials designated by the Secretary of Agriculture is independently established to govern agriculture and forestry related projects. The committee reviews domestic agriculture and forest related offset projects. Also, the Department of Agriculture has jurisdiction over domestic forest carbon offset projects but Environment Protection Agency in consultation with the Department of State and the Agency for International Development has the authority to issue international carbon offset credit concerning the carbon emission reduction in developing nations and collection and storage related projects.

This bill limits the utilization scope of carbon offset for the fulfillment of the obligation and domestic and international carbon offset levels. The total carbon offset reduction amount is limited to 2 billion tons a year. The carbon offset system allows overseas offset credit trading while connecting domestic scheme and overseas scheme. The bill sets the ratio between domestic reduction and overseas reduction to 1:1 and recognizes forest conversion and devastation prevention projects of developing nations as the offset project. Domestically, wetland management, wood product, urban forest development and management, and the new technology or plants that enhance carbon fixation are recognized in addition to Article 3.3 and 3.4 (Afforestation, Reforestation, Prevention of Deforestation, and Forest Management) of the Kyoto Protocol (American Clean Energy and Security Act, 2009).

For state level carbon offset project involving forest sink in response to climate change, RGGI (Regional Greenhouse Gas Initiative) targets afforestation and CAR (The Climate Action Reserve), afforestation/reforestation, the prevention of deforestation, and forest management for the project.

Concerning private sector, CCX (Chicago Carbon Exchange) includes afforestation/reforestation, the prevention of deforestation, and forest management, and wood product carbon fixation in the scope of carbon offset project to let CCX members use the credits produced through forest sink project to fulfill the reduction goal allocated to each member (Chicago Climate Exchange, 2009; 2010).

Table 5. Major Contents of the Forest Sink Policy of the USA

	Major Contents
Federal Government	– American Clean Energy and Security Act (passed House of Representatives in September 2009): Introduced ETS – Includes new forestation, reforestation, the prevention of forest conversion, forest management, wetland management, and urban forest development in the scope of offset project
State Government	– RGGI (10 Northeastern States of America): New forestation – CAR (California): new forestation, reforestation, the prevention of forest conversion, forest management, and urban forest development
Private Sector	– CCX (Excluding EU): new forestation, reforestation, the prevention of forest conversion, forest management, urban forest development, wood product carbon account

Australia

Like the USA, Australia withdrew from the Kyoto Protocol, and it displays far greater emission of greenhouse gas through the conversion of forest than the absorption through forest management among Annex I countries.

Australia's forest sink policy in response to climate change focuses on the change of land usage centering on forest such as afforestation, reforestation, and the prevention of deforestation rather than forest management. To push forward with this policy, Australia is putting great efforts into the enhancement of the function of the forest in relation to forest sink such as providing emission rights that can be traded in the market to the forest sink.

The federal government of Australia announced Australia's Climate Change Policy in July 2007 and indicated that they will introduce the emission trading scheme as of 2011. This scheme is called "Australian Emission Trading System (AETS)", and it takes cap and trade system as EU–ETS does. It indicates that the emitters such as the fixed emitter which emits greenhouse gas through fuel combustion, transportation sector, fugitive emission, industrial process, waste, and "forest sector" must participate in the AETS, and it includes all 6 greenhouse gases specified in the Kyoto Protocol as the subject of trade (Yim, 2008; Australian Greenhouse Office, 2007).

The forest sector is participating as a carbon offset project and the trade will be limited to the reforestation which is Article 3.3 of the Kyoto Protocol. For the reforestation activity that complies with the definition by the Kyoto Protocol, the emission right will be acknowledged through voluntary participation from the beginning. The scope of participants for reforestation is limited to forest land owner, special lessor, and emission right owner (the last two participants must have concluded appropriate contract with the forest land owner). The greenhouse gas absorption and emission in the forest chosen for reforestation must be calculated based on the methodology specified by the government (The National Carbon Accounting System: NCAS). Reforestation registered before the first commitment period of the Kyoto Protocol is also included retroactively in the calculation, and if the registration is made afterwards, the emission right is recognized for the absorption counted after the registration is completed. Conversion of forest is not included in the emission trading scheme. Instead, studies are conducted continuously on the incentive system or carbon offset plans to prevent the conversion of forest.

Apart from the effort of the federal government, state governments are also pushing forward with policies related with the ownership of the carbon dioxide sink in the course of organizing the condition for participation in the emission trading market for the forest sector. Victoria and New South Wales have already legislated in favor of the carbon credit which legally recognizes CO_2 sink, and Queen's Land is also in process of legislating in favor of the carbon credit.

In Victoria, the carbon credit is called "carbon sequestration right" or "carbon right" and it is specified in the Forestry Right Act (1996). This act was enacted in 1996 and revised in May 2005 to clearly evaluate the right of carbon. According to Article 3 of the Act on Forest Properties Right, the carbon sink is defined as "the right give to the carbon that can be obtained commercially through the absorption of which through trees" and the forest properties right owner (forest owner) can conclude a contract to transfer his or her carbon right to the third party by Article 12.1 (Contract of Carbon Right) of the Act. Also, Article 12.2 indicates that the contract must be concluded in writing and must specify contract parties, target land, the obligations and rights of contract, contract date, and expiration date concerning the contents to be included in the carbon right contract (State Government of Victoria. 1996).

CONCLUSION

Considering the characteristics of the forest sink policies of major countries to cope with climate change, EU is pushing forward with the afforestation, reforestation, forest management, and use of wood biomass and Japan is implementing their policies centering on forest management and New Zealand, on afforestation, reforestation, and the prevention of deforestation. The USA withdrew from the Kyoto Protocol, but the federal government and state government established emission trading schemes and are pushing forward with policies centering on afforestation and reforestation using forest related carbon offset projects within the scheme. Similarly to the USA, Australia is also pushing forward with policies centering on afforestation and reforestation. In other words, EU, the USA, Australia, and New Zealand are pushing forward with forest sink policies by giving heavy importance to the change of land use such as afforestation and reforestation while Japan is focusing on forest management activities. This tendency of Japan is attributed to the fact that Japan has little land available for additional afforestation and reforestation as Korea does.

Table 6. Major Contents of Australia's Forest Sink Policy

	Major Contents
Federal Government	– Introduction of Australian Emission Trading (2011): Reforestation
State Government	– New South Wales, introduction of NSW–ETS (2003): afforestation / reforestation – Victoria: Carbon sink is stipulated in the Forestry Right Act, reorganization of forest investment inducement conditions

Also, the forest sink policies of major countries excluding EU which does not approve the use of emission rights generated through forest sink projects in the emission trading scheme are pushing forward with the forest sink expansion policies in connection with forest related carbon offset projects. Under the circumstances, Korea needs to realize sustainable forest management and expand forest sink by participate in the future emission trading scheme through the carbon offset project led by forest sector.

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