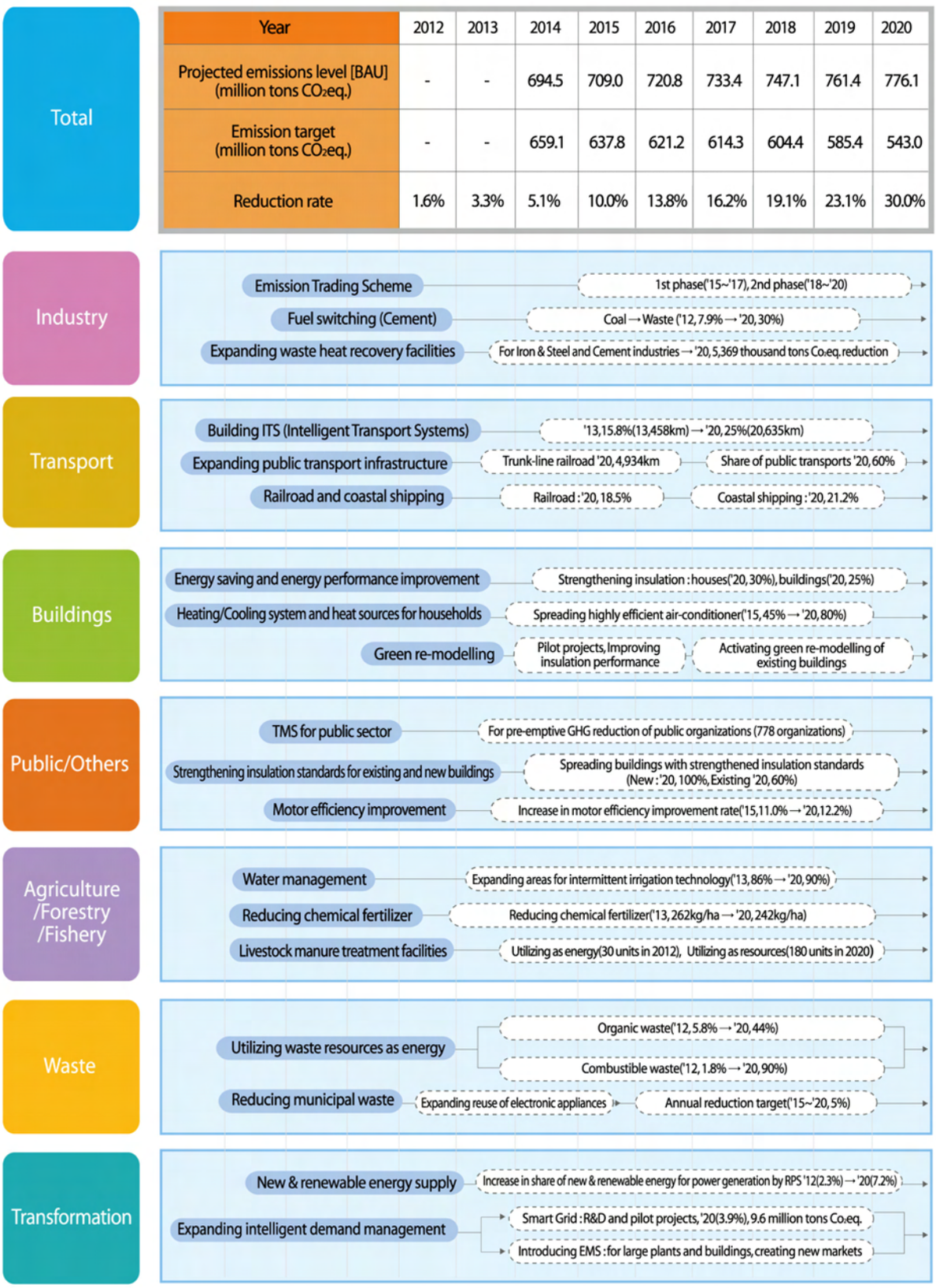

Figure 3.3. Emission Reduction Action Plans by Sector (2014-2020)

In addition, several flexibility mechanisms—including banking, borrowing, and off-setting—will be allowed to reduce mitigation costs and to secure liquidity in the allowances market. While unlimited carryover of the remaining allowances to the next year will be allowed to provide incentives for mitigation efforts, there will be a quantitative limit[16] on the borrowing of allowances and the use of offsets to ensure the effectiveness of the system. For example, the use of offset can be utilized only for reductions that meet global standards, such as the certification of Certified Emission Reductions (CER) from Clean Development Mechanism (CDM) projects in securing environmental integrity[17]. Accordingly, this has been specified in the *Guidelines for Validity Assessment of Reduction Projects and Certification of Emission Reductions*.

The data used for allocation was based on accumulated greenhouse gas emission reports submitted by controlled entities over the years under TMS. This installation and facility level data has been collected from 2007 until the present. The data is extremely reliable as it has been checked through a third-party verification system and a double-review system in the supervising agency and authority.

3.4. Mitigation Actions by Sector

In November 2009, Korea fixed the national mid-term GHG reduction targets 30% lower than BAU level by 2020. In turn, it also set up specified reduction targets by sector and industry, as well as emission reduction rates for each year.

First, in all sectors, the TMS has been implemented since 2010 to achieve national mid and long-term GHG reduction targets and to reduce energy consumption—especially with large GHG emitters and large energy consumers. In addition, the ETS will be implemented from 2015 onward to set the total GHG emission rates for business entities and to achieve GHG reduction targets through the ETS.

16) Borrowing is only allowed in the next year of the plan period, and the quantitative limit for borrowing is 10% of allowances to be submitted to authorities. The quantitative limit for offsetting is same as that for borrowing.

17) Articles 29 and 30 of the Act on Allocation and Trading of Greenhouse Gas Emissions Allowances

In the energy transformation sector, Korea is preventing GHG emissions by Renewable Portfolio Standard (RPS) mandate and offering subsidies for new and renewable energy power plants. Moreover, it is treating emitted GHGs by encouraging the development of technologies for the capture and storage of CO_2.

In the industry sector, Korea is proposing emission reduction measures for each step of the national energy system, from the establishment of the energy supply and demand plan to energy distribution and usage. In this regard, the Consultation on Energy Use Plan aims to ensure efficient energy consumption by analyzing the impact of businesses on GHG emission during the establishment stage of the plan. In addition, heat and electricity generated from district heating and cooling systems and integrated energy systems of industrial complexes are distributed to a variety of consumers. Since 2011, the Energy-Efficiency Standard & Labelling program has been implemented for this objective.

In the building sector, Green Building Standards Code, Building Energy Efficiency Grade Certification System, and Green Home Performance Evaluation System have been implemented to pursuit comprehensive energy efficiency with buildings' design and operation.

In the transport sector, the Intelligent Transport Systems (ITS) has been established to expand public transport infrastructure and Voluntary Logistics Energy Target Management System has encouraged 140 companies to participate as of 2014. Moreover, the target of automobile fuel economy management has been expanded to reduce GHG emissions by cars.

In the agriculture, forestry, and fishery sectors, Korea has taken actions to reduce GHG emissions from rice farmlands with the water management for rice crops since 2010 and has expanded the Livestock Manure-To-Energy system since 2007.

Finally, in the waste sector, Korea has sought to minimize the generation of municipal and industrial waste since 2008. And it has reduced carbon dioxide and methane emissions by processing combustible and organic waste into energy and by recovering and reusing landfill gases.

Table 3.3. Mitigation Actions and Effects

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
All Sectors	Greenhouse gas & energy target management system (GHG & Energy TMS	CO_2 CH_4 N_2O	GHG and energy reduction	o To regulate GHG emissions and the energy consumption of business entities emitting large amounts of GHGs in order to achieve national mid-and long-term GHG reduction targets and to reduce energy consumption	Policy	Ministry of Environment	Implemented	2010.4	The amount of GHG emission reduction
	Emissions Trading Scheme (ETS)	CO_2 CH_4 N_2O	GHG and energy reduction	o To set the total amount of GHG emission permits for each company and to compel it to achieve GHG emission reduction targets through emission permits trading alongside its own GHG reduction efforts.	Policy	Ministry of Environment	Planned	2015	The amount of GHG emission reduction
Energy transformation	New & renewable energy supply expansion and industry fostering	CO_2	Contributing to the creation of new & renewable energy markets by encouraging GHG emission reductions and by creating a stable investment environment where companies can invest in new & renewable energy industries	o To enforce FIT(2002~2011) and RPS(from 2012) in order to require power generation companies possessing more than certain amount of power generation facilities (500 thousand kW) to supply new & renewable energy of more than a certain percentage of the total power generation. o To expand new & renewable energy supplies and create a supply base of newly developed technologies through a project to subsidize a portion of installation costs for new & renewable energy projects, including houses (1 million Green homes), buildings (general supply), regions (regional supply), etc. o To make domestic technical standards for new and renewable energy equipment in compliance with international standards and to bring national standards in line with international standards as a COSD*(designated in 2009) * Cooperation Organization for Standards Development (COSD): the organization is accredited by the Korean Agency for Technology and Standards for its ability to develop KS standards for each specialized sector	Policy	Ministry of Trade, Industry, and Energy	Implemented	Informed separately	Power supplied by New and Renewable Energy (TOE)

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Energy transformation	CO_2capture and treatment	CO_2	Innovative technology development of CO_2 sequestration and treatment	o In accordance with the National CCS comprehensive promotion plan (July 2010, interagency meeting) to develop an innovative technology—to capture CO_2 from large emission sources to compress and transport or store underground or into the marine geological structure, or to convert into useful substances	Technology development	Ministry of Science, ICT and Future planning	Technology development underway	2011	To secure cost-competitive CO_2 Capture technology by 2020
Industry	Energy audit system	CO_2 CH_4 N_2O	Contributing to energy reduction at the national level	o To require businesses consuming more than 2,000 TOE annually to receive energy audit on a periodic basis.	Policy	Ministry of Trade, Industry, and Energy	Implemented	2007.1	-
	Consultation on energy use plan	CO_2 CH_4 N_2O	The realization of a low energy consuming society	o To analyze how the implementation of agreed target projects affects energy supply and demand and GHG emissions as a result of energy consumption, and to create plans for required energy supplies and the rational use of energy and its evaluation.	Policy	Ministry of Trade, Industry, and Energy	Implemented	1991.12	-
	Investment support for energy-efficiency facilities	CO_2 CH_4 N_2O	Promoting an energy-saving facilities supply, and the enhancement of energy reduction and energy use efficiency	o To give long-term loans with low interest rates for investment in energy-saving facilities for energy use rationalization and GHG reduction (such as investment projects and the installation of target management companies).	Policy	Ministry of Trade, Industry, and Energy	Implemented	1980	The amount of Energy Saving (TOE, Tonnage of Oil Equivalent)
	Expansion of energy service company project	CO_2 CH_4 N_2O	Promotion of energy-saving facilities supply, and enhancement of energy reduction and energy use efficiency	o A project to allow energy users in need of technical skills and funding ability to make replacement for energy-saving facilities through contracts with energy service company (ESCO).	Policy	Ministry of Trade, Industry, and Energy	Implemented	1992	-
	Energy-efficiency standard & labelling program	CO_2 CH_4 N_2O	Promotion of high-efficiency products production, technology development and energy-saving products purchase of consumer	o A system to enforce efficiency grade labelling (from 1st to 5th grade) according to energy consumption efficiency (usage) of target products and to prohibit production and sales of products not meeting the lowest consumption efficiency standards	Policy	Ministry of Trade, Industry, and Energy	Implemented	1992	The amount of Energy Saving (TOE)

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Industry	Standby power warning indication system	CO_2 CH_4 N_2O	Promotion of the implementation of standby power reduction function of electronic products and the supply of the products excellent in standby power reduction	o To induce the adoption of power saving mode during standby time and the minimization of standby power and to permit energy saving marks for the products meeting standby power reduction standards and to force the display of warning labels on the products failing to meet the standards.	Policy	Ministry of Trade, Industry, and Energy	Implemented	1999	–
	High-efficiency energy equipments certification system	CO_2 CH_4 N_2O	Promotion of the initial market formation and supply equipments with large energy-saving effects by certifying them as high efficiency equipments and the rise of technical standards of SMEs	o A system for the government to certify the products that meet certain criteria for energy consumption efficiency to promote the development of the technologies for high efficiency products and to expand their supply. The certificate is issued for certified product and the product is displayed with high efficiency energy equipment marks. o Voluntary certification application system	Policy	Ministry of Trade, Industry, and Energy	Implemented	1996	The amount of Energy Saving (TOE))
	Integrated energy system	CO_2 CH_4 N_2O	Proactive response to the energy saving and climate change convention through the expansion of integrated energy supply	o A project to provide a large number of users with energy (heat and/or electricity) produced in the energy production facilities composed one or more of combined heat and power plant, heat-only boilers, and resource recovery facilities through district heating and cooling businesses and integrated energy systems of industry complexes.	Policy	Ministry of Trade, Industry, and Energy	Implemented	1985	–
	Voluntary emission reduction registration program	CO_2 CH_4 N_2O	Strengthening of SMEs' competitiveness and induction of early reduction	o A program to register the planned amounts after evaluating the domestic greenhouse gas reduction projects in accordance with objective assessment procedures and to recognize the reduction results during the validity period (5 years) of the program through the certification and inspection. o Target : Businesses with yearly greenhouse gas emissions reduction of more than 100t of CO_2 * Reduction businesses, of which starting point (a time when actual GHG reduction occurs) is within 1 year from the date of application. * Key registration target businesses : "Energy use rationalization businesses", "New & renewable energy development businesses", "Other reduction businesses recognized by the government"	Policy	Ministry of Trade, Industry, and Energy	Implemented	2005	–

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Transport	Increase in transport share rate of coast shipping	CO_2 CH_4 N_2O	Expansion of public transport infrastructure and the building of a low carbon logistics system	o To activate the Modal Shift from road to railroad and coast shipping in order to increase the transport share rate of coast shipping from 20.7% (2008) to 21.2% (2020) * The First Sustainable National Transport and Logistics Master Plan (June. 2011, Ministry of Land, Transport and Maritime Affairs)	Expansion of freight transport	Ministry of Oceans and Fisheries	Implemented	2010	Freight share rate of coast shipping (%)
	Improvement in ship energy efficiency	CO_2 NO_X, etc.	Development of testing and a certification system for green ship technology	o To increase the supply of new & renewable energy including solar, wind, and hydropower in the shipping sector : 0% (2007) → 5% (2020) * The First Sustainable National Transport and Logistics Master Plan (June. 2011, Ministry of Land, Transport and Maritime Affairs)	New & renewable energy supply	Ministry of Oceans and Fisheries	Implemented	2012	Achievement rate of target development(%)
	Strengthening of automobile GHG emission standards	CO_2	Automobile GHG emission reduction	o To set up and strengthen average greenhouse gas emissions and fuel economy standards for automobiles and to expand target models in order to gradually increase greenhouse gas reduction. o Frist stage (2012~2015): car and MPV (10 passengers or less), 140g/㎞ Second stage (draft) (2016~2020): car and MPV, 97g/km ; van (3.5 tons or less), 166g/km	GHG standard setting	Ministry of Environment	Implemented	2012.1~	The amount of GHG emission reduction
	Enhancement of traffic demand management and traffic operation efficiency	CO_2 CH_4 N_2O	Building a low-carbon intelligent transport systems (ITS) and promoting green transport	o Establishment of low carbon ITS - Expansion of intelligent transport systems (ITS) to the national main roads highways - Expansion of Interstate Bus information system - Installation of roundabouts preventing traffic accidents and reducing delays traffic and congestion at the same time o Vitalization of green transport systems - Introduction of main road express bus system, Promotion of bicycle use through public bicycle system - The selection and operation of a public transport -only area - Expansion of citywide railway service and building high-speed rail networks - Expansion of eco-driving education to save energy and to reduce automobile GHG emissions	Policy	Ministry of Land, Infrastructure and Transport, Ministry of Security and Public Administration	Implemented	2007	The rate of ITS establishment (%)

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Transport	Low carbon logistics system building	CO_2 CH_4	Building a low cost & high efficiency of green logistics system	o Enhancement of GHG reduction activities in the logistics system – Encouraging more companies to participate in the Voluntary Logistics Energy Target Management system – The number of participant companies in the Voluntary Logistics Energy Target Management system as of 2014 : 140 – Establishing guidline for the designation of well –managed companies practicing Green Logistics – Expanding the recognition of well–managed companies practicing Green Logistics – The number of companies recognized for well –managed practices with Green Logistics as of 2014: 4 – Vitalization of Modal Shift from road freight into rail freight	Policy	Ministry of Land, Infrastructure and Transport	Implemented	2010	The number of companies designated as the well–managed practices for the Green Logistics
Building	Building energy efficiency grade certification system	CO_2 CH_4 N_2O	Promotion of the buildings excellent in energy performance and enhancement of energy use efficiency in the building sector	o To assess the amount of energy required for building operations—including heating, cooling, hot water, etc. —with design documents and to give a grade to each building from 1+++ to 7 (10 grades) according to its energy performance for certification. – A certificate (preliminary certification and certification) is issued after the certification evaluation by a certification authority and the certification results are managed in the operating agency.	Policy	Ministry of Land, Infrastructure and Transport, Ministry of Trade, Industry, and Energy	Implemented	2001.6	The number of certificate issued
	Green Home Performance Evaluation system	CO_2 CH_4 N_2O	Expansion of Green Buildings' supply	o To comply with construction and performance standards of energy–saving Green Buildings for climate change response and low carbon green growth. – Mandatory submission of Green Home performance reports and supporting documents for the relevant authority (head of local government) at the time of application for project approval for apartment buildings with more than 30 units, and project approval decisions in accordance with the opinion of energy–related professional organization.	Policy	Ministry of Land, Infrastructure and Transport, Ministry of Trade, Industry, and Energy	Implemented	2009.10~	The supply rate of Green Building (%)

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Agriculture, forestry and fishery	Enlarging areas of intermittent irrigation in rice cropland	CH_4	GHG reductions through the management of water supplies in rice cropland	o GHG reductions in rice cropland through development and distribution of related technologies to manage water more efficiently in rice cropland	Policy	Ministry of Agriculture, Food and Rural affairs	Implemented	2010	The ratio of intermittent irrigation area(%)
	Reduction in chemical fertilizer usage	N_2O	GHG reductions by reducing the use of chemical fertilizers	o Reducing chemical fertilizer usage by supporting the use of organic fertilizers and soil conditioners	Policy	Ministry of Agriculture, Food and Rural affairs	Implemented	2000	The amount of chemical fertilizer used (kg/ha)
	Expansion of livestock manure treatment facility	CH_4	GHG reductions by using livestock manure as resource	o GHG reductions by expanding facilities with livestock manure treatment to generate more efficient levels of energy and resources	Policy	Ministry of Agriculture, Food and Rural affairs	Implemented	2007	The number of livestock manure treatment facilities launched
	Expansion of high-quality forage cultivation	CH_4	GHG reductions by increasing provision of high-quality forage to livestock	o GHG reductions through improved enteric fermentation of animals by cultivating high-quality forage and increasing provision to livestock	Policy	Ministry of Agriculture, Food and Rural affairs	Implemented	1998	The supply rate of high-quality forage (thousand ton)
	Expansion of new & enewable energy facility	CO_2 CH_4 N_2O	Reduction of GHG from controlled agriculture through expansion of new & renewable energy facilities	o To reduce fossil fuel consumptions through expanded supplies of new & renewable energy facilities.	Policy	Ministry of Agriculture, Food and Rural Affairs	Implemented	2010	The area of renewable energy facilities supported (ha)
	Expansion of energy reduction facilities supply	CO_2 CH_4 N_2O	GHG reduction through expanded supply of energy reduction facilities for greenhouse farming	o To reduce fossil fuel consumptions through expanded supplies of energy reduction facilities for controlled agriculture.	Policy	Ministry of Agriculture, Food and Rural Affairs	Implemented	2009	The area of energy reduction facilities supported (ha)
	Afforestation	CO_2	Expansion of carbon sinks in the forestry sector	o To promote a new afforestation project on the idle land, including marginal farmlands, used village land, and deforested land for the expansion of carbon sinks.	Policy	Korea Forest Service	Implemented	2007	The area of afforestation
	National long-term measures for forest fire prevention	CO_2	Capacity building for improved responses to forest fires	o To establish long-term measures every five years for an efficient and systematic way to prevent forest fires	Policy	Korea Forest Service	Implemented	2012~2016	The area damaged by forest fire compared to dry days

Sectors affected	Name of mitigation action	GHG (s) affected	Objectives	Description of mitigation actions	Type of instrument	Implementing ministry	Status of implementation	Start year and month of implementation	Performance indicator(s)
Agriculture, forestry and fishery	Creation of city forest	CO_2	Expansion of carbon sinks through the creation of urban forest and street trees, etc	o Central government and local governments continue to create urban forests with available budgets and motivate the participation of citizens, organizations, and businesses to improve the quality of urban life and the expansion of carbon sinks	Policy	Korea Forest Service	Implemented	2003	The area of city forest and the length of street trees created by the project
	Forest carbon offset scheme	CO_2	Support of voluntary CO_2 reduction in private sector	o A scheme established according to the act on the management and improvement of carbon sink(in 2013) to support voluntary CO_2 emission reduction efforts in private sector by using carbon sinks, such as afforestation, forest management, wood products use, forestry biomass energy use, etc.	Policy	Korea Forest Service	Implemented	2013	The number of forest carbon offset registered
Wastes	Reduction of municipal wastes	CO_2 CH_4	Minimization of municipal waste	o To create a resource recycling society through the implementation of municipal waste reduction policy.	Policy	Ministry of Environment	Implemented	2008	The reduction rate of municipal wastes (%)
	Reduction of industrial wastes	CO_2 CH_4	Minimization of industrial waste	o Continuous reduction in industrial waste generation intensity – 52.4 kg/ton (2010) → 49.8 kg/ton (2014) → 45 kg/ton (2020)	Policy	Ministry of Environment	Implemented	2008	Industrial waste generation intensity (kg/ton)
	Waste wood recycling	CO_2 CH_4	GHG reduction through waste wood recycling	o Promotion of waste wood recycling – Increase of waste wood recycling rate from 57% 2011 to 90% in 2020.	Policy	Ministry of Environment	Implemented	2008	The recycling rate of waste wood (%)
	Landfill gas recovery	CO_2 CH_4	GHG reductions through increased landfill gas recovery rates	o Increase in landfill gas recovery and power generation – Increase from 84% in 2010 to 90% in 2020	Policy	Ministry of Environment	Implemented	2010	The rate of landfill gas recovery and power generation (%)
	Utilization of organic waste as energy	CO_2 CH_4	GHG reductions by increasing the utilization of organic waste as energy	o Increase in energy conversion rate of organic waste – Increase from 5.8% in 2012 to 44% in 2020	Policy	Ministry of Environment	Implemented	2008	The utilization rate of organic waste as energy (%)
	Utilization of combustible waste as energy	CO_4 CH_4	GHG reductions by increasing the utilization of combustible waste as energy	o Increase in energy conversion rate of combustible waste – Increase from 1.8% in 2012 to 90% in 2020	Policy	Ministry of Environment	Implemented	2012	The utilization rate of combustible wastes as energy(%)

REFERENCES

Ministry of Land, Infrastructure and Transport. (2013). *Statistical Yearbook of MOLIT.*

Ministry of Land, Infrastructure and Transport. (2013). *Vehicle Registration.*

The Republic of Korea. (2011). *Korea's Third National Communication under the United Nations Framework Convention on Climate Change*.

Korea Forest Service. (2010). *Basic Forest Statistics.*

Ministry of Trade, Industry and Energy and Korea Energy Economics Institute. (2013). *2013 Energy Statistics Yearbook.*

Statistics Korea. (2010). *2010 Population and Housing Census - Complete Survey Results.*

Statistics Korea. (2012). *Population Forecast by Province: 2010-2040.*

Korea Rural Community Corporation. (2012). *Agricultural Infrastructure Improvement Statistics Survey.*

Ministry of Environment. (2013). *National Waste Generation and Disposal.*

Bank of Korea's Economic Statistics System (ECOS) https://ecos.bok.or.kr/

E-National Index http://www.index.go.kr/

Korean Statistical Information Service http://kosis.kr/

Population and Housing Census http://census.go.kr/

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change from 1990 to 2012
	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	(%)
1. Energy	241,450.47	259,437.95	279,363.86	309,539.06	328,792.80	354,684.12	386,721.66	411,251.82	351,373.59	382,433.44	411,937.13	426,109.15	445,039.01	452,714.58	460,754.59	468,848.11	475,256.02	494,290.12	508,599.24	514,907.13	568,636.15	597,603.22	600,255.01	148.60
2. Industrial Processes	20,378.02	24,122.73	29,657.40	33,823.78	38,370.13	42,629.31	43,745.03	48,913.88	40,272.68	47,557.97	49,603.49	48,057.53	51,706.46	54,872.68	57,245.52	53,889.79	52,631.93	52,307.87	51,072.43	46,606.99	52,418.11	51,682.95	51,282.85	151.66
3. Solvent and Other Product Use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4. Agriculture	23,757.07	23,592.20	23,599.39	23,741.08	24,212.57	24,500.49	24,749.06	24,935.60	25,010.16	24,510.21	23,742.73	22,825.99	22,222.47	21,746.32	21,603.37	21,512.13	21,385.08	21,470.17	21,527.89	21,846.58	21,962.87	21,863.91	21,992.85	-7.43
5. Land Use, Land-Use Change and Forestry[b]	-34,405.44	-33,635.46	-31,716.63	-33,807.50	-32,116.45	-35,435.10	-39,399.62	-47,969.89	-55,678.14	-58,769.58	-58,949.68	-56,746.80	-56,014.59	-57,225.17	-55,173.81	-56,635.56	-57,279.05	-58,085.72	-57,538.39	-54,710.56	-54,873.69	-51,271.60	-50,936.90	48.05
6. Waste	9,914.26	11,006.21	12,007.23	12,739.13	13,450.36	14,783.54	15,585.63	16,284.09	15,023.01	15,826.50	17,794.81	18,667.91	17,604.35	17,700.95	16,603.61	15,681.80	16,031.44	14,691.87	14,486.68	14,464.76	14,123.89	14,580.23	14,810.85	49.39
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	261,094.38	284,523.63	312,911.25	346,035.55	372,709.40	401,162.36	431,401.76	453,415.49	376,001.30	411,558.56	444,128.47	458,913.78	480,557.69	489,809.37	501,033.27	503,296.27	508,025.42	524,674.31	538,147.85	543,114.90	602,267.32	634,458.72	637,404.66	144.13

NA : Not Applicable
NO : Not Occurring

Table 5.2. Emission trends(CO_2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq	kt CO_2eq
1. Energy	232,486.14	251,413.82	272,438.80	303,380.73	323,157.30	349,344.54	381,142.08	405,345.83	345,897.20	376,407.89	405,474.13	419,366.52	437,903.18	445,346.25	452,706.68	460,525.69	466,603.59	485,083.23	498,433.94	505,488.91	557,464.89	585,432.29	587,222.03
A. Fuel Combustion (Sectoral Approach)	232,486.14	251,413.82	272,438.80	303,380.73	323,157.30	349,344.54	381,142.08	405,345.83	345,897.20	376,407.89	405,474.13	419,366.52	437,903.18	445,346.25	452,706.68	460,525.69	466,603.59	485,083.23	498,433.94	505,488.91	557,464.89	585,432.29	587,222.03
1. Energy Industries	47,511.27	53,947.78	61,405.64	68,456.97	82,273.90	91,304.44	107,243.74	120,791.76	104,776.79	114,483.55	134,532.46	145,633.87	154,059.27	158,120.65	171,571.15	176,740.83	185,781.49	197,244.60	210,490.30	229,471.23	254,815.11	262,574.97	265,905.94
2. Manufacturing Industries and Construction	76,102.99	88,221.13	97,330.29	107,438.12	112,417.40	116,092.76	123,704.07	127,445.98	118,551.79	124,166.29	128,805.11	129,192.24	134,732.01	136,951.62	134,345.18	133,708.04	135,090.97	141,471.89	146,029.15	135,673.24	159,739.89	180,983.88	178,335.68
3. Transport	35,240.16	38,319.68	43,645.12	55,171.56	57,153.19	64,262.38	68,301.79	73,659.27	57,099.87	62,093.11	69,381.54	72,505.32	77,448.98	80,235.11	80,388.67	81,196.10	81,977.10	84,247.13	82,079.32	82,917.13	84,619.88	84,248.28	85,658.86
4. Other Sectors	73,631.72	70,925.24	70,057.74	72,314.09	71,312.80	77,684.96	81,892.48	83,448.82	65,468.74	75,664.94	72,755.03	72,035.08	71,662.92	70,038.87	66,401.69	68,880.72	63,754.02	62,119.61	59,835.16	57,427.31	58,290.02	57,625.16	57,321.55
5. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
B. Fugitive Emissions from Fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Solid Fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and Natural Gas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	18,945.28	22,448.14	24,820.99	28,670.33	31,100.71	32,715.50	32,941.22	33,928.82	27,470.69	28,414.32	29,392.10	30,462.20	31,482.67	32,233.05	31,028.16	28,440.09	28,145.99	33,396.91	32,963.33	29,769.66	31,080.42	32,055.76	31,977.17
A. Mineral Products	18,095.00	21,622.47	23,923.79	27,855.33	29,928.34	31,450.17	31,704.57	32,831.99	26,425.00	27,386.27	28,540.89	29,584.65	30,989.15	31,834.86	30,554.82	27,957.95	27,848.52	33,059.74	32,584.38	29,463.94	30,756.02	31,823.67	31,793.99
B. Chemical Industry	754.84	747.77	812.35	707.48	1,051.46	1,127.53	1,090.93	930.20	908.56	886.49	703.51	733.93	340.14	241.03	303.97	287.96	154.42	156.98	159.96	150.46	146.63	53.61	1.81
C. Metal Production	95.43	77.90	84.84	107.53	120.91	137.80	145.72	166.63	137.13	141.56	147.70	143.61	153.39	157.16	169.37	194.18	143.06	180.18	218.99	155.26	177.77	178.47	181.37
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6																							
F. Consumption of Halocarbons and SF_6																							
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Solvent and Other Product Use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4. Agriculture																							
A. Enteric Fermentation																							
B. Manure Management																							
C. Rice Cultivation																							
D. Agricultural Soils																							
E. Prescribed Burning of Savannas																							

NA : Not Applicable
NO : Not Occurring
NE : Not Estimated