

National Report by the Republic of Korea 2017

Enhanced Black Carbon and Methane Emissions
Reductions – Arctic Council Framework for Action

National Report by the Republic of Korea

Enhanced Black Carbon and Methane Emissions Reductions

Background

1. Black Carbon – current status

The Republic of Korea released a national inventory of anthropogenic black carbon emissions for the first time in 2017 for the year 2014. In 2014, approximately 13,426 tonnes (13kt) of black carbon were emitted in the country, of which mobile sources accounted for 91.4%. By sector, 49.1% of black carbon emissions were from off-road transport, 42.3% from on-road transport, 4.8% from manufacturing industry combustion and 2.4% from energy industry combustion.

Figure 1. Black Carbon Emissions by Sector (2014) in the Republic of Korea

Sector	Black Carbon (ton)	Percentage
Combustion in energy industries	324	2.4%
Public power generation	219	1.6%
District heating production plants	17	0.1%
Oil refinery	5	0.03%
Private power generation	83	0.6%
Non-industrial combustion	156	1.2%
Commercial and institutional plants	9	0.1%
Residential plants	130	1.0%
Plants in agriculture, forestry and aquaculture	16	0.1%
Combustion in manufacturing industries	648	4.8%
Combustion plants	20	0.1%
Process with or without contact	74	0.6%
Others	554	4.1%
Production process	15	0.1%
Petroleum industries	0.02	0.0002%
Iron and steel industries	11	0.1%
Wood, pulp industries	0.1	0.001%
Other	4	0.03%
On-road transport	5,674	42.3%
Passenger cars	33	0.2%
Vans	240	1.8%

Buses	158	1.2%
Trucks	3,939	29.3%
Other vehicles	52	0.4%
Recreational cars	1,252	9.3%
Off-road transport	6,594	49.1%
Railroads	344	2.6%
Ships	1,004	7.5%
Aircraft	61	0.5%
Agricultural machineries	968	7.2%
Construction machineries	4,218	31.4%
Waste	3	0.02%
Waste incineration	3	0.02%
Other	11	0.1%
Forest fire and other fire	11	0.1%
TOTAL	13,425,984	100.0%

Source: 2014 National Air Pollutants Emission
(National Institute of Environmental Research, 2017)

2. Methane – current status

The second Biennial Update Report¹, which the Republic of Korea submitted to the UNFCCC in 2017, contains a summary of national greenhouse gas inventory including methane emissions. The methane emissions in 2014 were 26.8 million ton CO₂eq., a 13.2 percent drop from 1990. The methane emissions in 2014 (including the LULUCF sector) were 4.1 percent of national total greenhouse gas emissions.

The methane emissions have decreased in the recent three years (year-over-year increase/decrease: 0.2% increase in 2012, 0.1% decrease in 2013 and 1.8% decrease in 2014). By sector, 46 percent of methane emissions were from agriculture, 29.2 percent from waste, 22.3 percent from energy, 2.1 percent from industrial processes and 0.7 percent from the LULUCF sector. Emissions from agriculture are down by 15.7% from 1990 owing to the diminishing size of rice cultivation regions. Energy sector also saw 25.1% emission reduction because of declining consumption of solid fuel. Emission from waste sector decreased by 3.3% with the adoption of landfill management policies.

¹ http://unfccc.int/national_reports/items/408.phd

Figure 2. CH₄ Emissions by Sector (2010-2014) in the Republic of Korea
(Unit: million ton, CO₂eq)

Sector		1990	2010	2011	2012	2013	2014
1. Energy	1A Fuel combustion	2.8	1.6	1.7	1.7	1.7	1.8
	1B Fugitive emissions	5.1	3.9	4.1	4.4	4.5	4.2
2. Industrial processes		0.1	0.5	0.5	0.5	0.5	0.6
4. Agriculture	4A Enteric fermentation	3.0	4.3	4.2	4.4	4.4	4.2
	4B Manure management	0.8	1.3	1.1	1.2	1.3	1.3
	4C Rice Cultivation	10.8	7.5	7.3	7.1	6.9	6.8
	4F Wetlands	0.024	0.018	0.016	0.015	0.015	0.016
5. LULUCF		0.1	0.2	0.2	0.2	0.2	0.2
6. Waste	6A Waste landfill	7.5	7.8	7.6	7.3	7.2	7.3
	6B sewage Treatment	0.6	0.5	0.4	0.4	0.4	0.4
	6D Other	-	0.02	0.03	0.02	0.1	0.1
CH₄ Total emission (including LULUCF)		30.9	27.5	27.3	27.3	27.3	26.8

Source: 2016 National Greenhouse Gas Inventory Report of Korea
(Greenhouse Gas Inventory and Research Center, 2016)

Mitigation Actions and Future Plans

1. Black Carbon Mitigation Actions

a. Current Activities

In Korea, the total suspended particulate matter standard of dust emissions including black carbon from coal-fired power plants has been set at 10mg/m³ for facilities constructed after 2015 and at 20mg/m³ for those constructed before 2015.

In addition, Korea introduced and implemented “Real Driving Emission Management System for Diesel Vehicles” (since January 2016 for large vehicles and October 2017 for small vehicles) and tightened laboratory testing conditions for small and mid-sized diesel vehicle in accordance with

the Worldwide harmonized Light vehicles Test Procedure (WLTP) adopted in October 2017.

With the introduction of EURO-4 in January 2017 (EURO-5 to be introduced in January 2020), two-wheeled motor vehicles are now subject to a specific standard. Starting in January 2015 when Tier 4 emission standards were introduced, a number of different types of off-road mobile sources were also placed under domestic emission regulations (6 types of construction machines as of now to 30 types after 2015) and emission standards were strengthened as well.

b. Future Plans

Korea plans to tighten dust emission standards for coal-fired thermal power plants from 2019. Currently, the Korean government is conducting a review to determine the scope of subsidizing the scrappage of old trucks. The government also plans to significantly increase the annual average number of vehicles to benefit from its support for early scrappage from 80,000 in 2017 to 160,000 units after 2018. For diesel vehicles in operation, exhaust gas emission standards are to be dramatically strengthened from 15% to 8% for close vehicle inspections and from 20% to 10% for regular inspections in 2018.

2. Methane Mitigation Actions

a. Current Activities

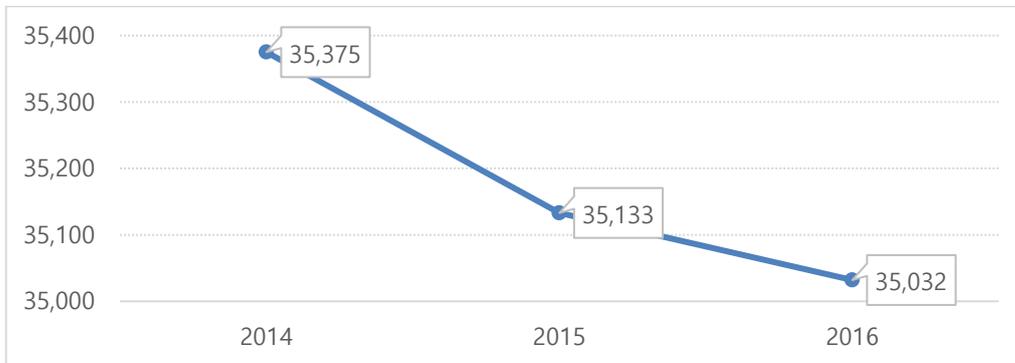
The Korean government has been making efforts to construct more landfill gas power plants, in which emitted methane gases are collected, refined and then used to generate electricity. In 2007, the government enacted a law on the management and usage of livestock excretion and has been supporting the livestock industry to generate energy from livestock excretion. It also designated several cities such as Hongcheon, Gangwon Province, as Eco-Friendly Energy Towns. These towns have eco-friendly facilities including those that turn livestock excretions into energy for heating and cooking.

The Korean government has been making efforts to reduce the amount of landfill wastes and minimize direct landfill disposal while expanding the

recycling of municipal and commercial wastes.

Figure 3. Waste volume to landfill

(Unit: ton/day)



The government is also promoting the cultivation of high-quality bulky feeds (including forage barley and ryegrass) and improving livestock feeds for enhanced intestinal fermentation.²

Korea has been continuously working to produce energy from livestock excretion and increasing the number of such facilities from 8 in 2014 to 12 in 2016. It also increased the number of resource recovery plants from 108 in 2014 to 117 in 2016.

b. Future Plans

The government plans to diversify the use of landfill gas from landfill wastes. Landfill gas is only used for power generation but in the future, it will be used as an alternative energy to LNG as well. Under such plan, the technical guidelines for biogas plants using food waste and livestock excretion is to be established and revised. In addition, the technical forum on combustible waste-to-energy will be held on a regular basis.

Successful Cases and Implications

<Landfill Gas Collection and Generation>

² Feed cultivation plants: 19,489.1ha (40 plants) in 2015 → 20,630.1ha (45 plants) in 2016

CH₄ recovered from landfill gas recovery facilities has been used as a source of power generation and heating. After capturing and using landfill gases, methane recovery from landfills had increased from 56,000 ton in 1998 to 119,000 ton in 2016.

The Arctic Project

<Tripartite Joint Research (Korea, China and Japan) on Long-range Transboundary Pollutants (LTPs)>

1. Background

The joint research was launched to help the three countries establish their policies on air quality so as to better understand and improve the status of air quality in the region. At the Northeast Asia Workshop on Long-range Transboundary Pollutants held in 1995, the three countries agreed to establish a working group comprised of civil servants and experts from each country to support the tripartite joint research on LTPs and to establish a secretariat at the National Institute of Environmental Research (NIER) of the Republic of Korea in 1996.

2. Objectives

The joint research involves presenting and discussing the findings of the research conducted and submitted in the form of an annual national report with the following objectives:

- a. to improve understanding on LTP movements in Northeast Asia
- b. to provide scientific information to policymakers so as to prevent or minimize the adverse impacts of LTPs on the environment of Northeast Asia, and
- c. to build trust and strengthen international cooperation by sharing research findings and having continuous dialogues in order to improve air quality in Northeast Asia.

3. Expected outcomes

The Assessment Report, which will summarize the findings of the joint research on LTPs in its 4th stage, will be released at the next Tripartite Environment Ministers Meeting (TEMM, date to be determined) <END>