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TRENDS IN NATIONAL EMISSIONS OF DIOXINS IN THE REPUBLIC OF KOREA'S NON-INCINERATION PLANTS

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Introduction

"Emissions of dioxin countries (list)" is, for the eradication of unintentionally generated persistent organic pollutants (Persistent Organic Pollutants) are defined so as to create and manage in the Stockholm Convention, the Environment Department is in order to create a dioxin emissions of South Korea, to develop a calculation method of the classification system and emissions of dioxin emission sources to match the domestic situation, non-incineration facilities (iron and steel, non-ferrous metals, non-metallic minerals, energy, chemical, crematoria, etc.) to measure the dioxin, has been promoting the analysis of the measured data.

Emission sources of POPs for the management and eradication of persistent organic pollutants (POPs) for the implementation of Article 5 of the Treaty by the ratification of the entry into force and the country of the Stockholm Convention. And to create a list of the investigation and of the exhaust emissions, current state grasp of the whole country of POPs emissions facility, measurement, and activities are also to calculate the emissions of dioxin countries through surveys of (production), of POPs proper management the discharge list and evaluated for systematic and active efforts for, are prepared for future emission reduction plan. It was analyzed the factors affecting emissions of dioxin country to another by year and type of industry in this study.

Materials and methods

Sampling is the industry (steel, non-ferrous metals, non-metallic minerals, energy, chemicals, crematorium, etc.) samples of about 900 evenly on POPs emission facility (non-incineration plants) of approximately 1,200 in the country from 2008 to 2015 It was collected. Dioxin measurement and analysis was performed according to the standard test POPs process, the standard of oxygen concentration is not corrected emission concentration was calculated in terms of the concentration factor (TEF-I) in terms of the international toxicity equivalent. Sample tablets hydrochloric acid treatment, was a multi-layer silica gel column, an alumina column, the final concentrate is then injected jicheom available internal standard syringe, HRGC / HRMS (Aotospec Premier, Waters, USA), (JMS-8000, JEOL, JAPAN) It was analyzed using the mass selective ion detection method in the above resolution of 10,000 using. Dioxin emission calculation method was used for Semi Bottom-Up Approach, the emission factor by the method data actually measured by applying the Bottom-Up Approach using an average value of data measured to obtain the data that is not to measure the emission factor obtain by applying the Top-Down Approach was as high as possible the reliability of the emission factor(Table 1).

Results and discussion

Emission results are shown in table 2. and Fig 1. 71.3g national emissions in 2013 and this figure is about 57 percent compared to emissions 123.8g in 2001. National emissions are steadily decreasing trend. And in recent years that its decline is dwindling. Looking to industry type, the greater the decline of steel and non-ferrous sector. non-metallic, chemical and crematorium sector does not have much fluctuation. energy sector increased slightly due to the increase in power generation.

Reduce causes of steel and non-ferrous sector first, and then implemented POPs Control Act in 2008 was achieved a lot, such as air pollution prevention facilities, installations and improvements in the workplace Second, Ministry of the industry and "specific persistent organic pollutants in 2004 signed a voluntary agreement "for the reduction of steel, non-ferrous metals and industrial to the field of dioxins emitted from the discharge facilities in 2008 to 30%, aims to reduce to 50% by 2010, A, B, C etc., steel, chemical, 19 companies participated in the cement sector being identified as contributing to dioxin emissions. On the other hand, activity (production) has been steadily increasing in most industries. The reason is the decline in activity, despite increasing emissions is determined to be due to a greater contribution than the contribution of emission factors (emission levels) reduced by increased activity(Fig 2).

Acknowledgements
Thanks for the Ministry of Environment and the National Academy of Sciences created a classification system and guidelines for source emission estimation techniques.

References: (Example)
Unintentional POPs guidelines on research (September 2004, Ministry of Environment), creating dioxin emission inventories on national control measures laid discharge facility (12, 2010, the National Institute of Environmental Research, Ministry of Environment)

Table 1. 『Bottom-Up Approach』 및 『Top-Down Approach』 Emissions calculation procedure

Item	(가) Bottom-Up Approach	(나) Top-Down Approach
Characteristic	Measurement of all facilities	If some facilities measure or not to measure data
Statistics	Production of individual facilities	Production of each category
Measurement data	Emission factor of individual facilities	Emission factor of each category
Calculation	Calculate emissions for each Facilities	Emission factor × Production of each category
Calculate emissions	· emissions for each Facilities · Total emissions	Total emissions

Table 2. Annual changes in national emissions (Unit : g I-TEQ/yr)

Division	Steel	Non-ferrous sector	Non-metallic	Chemical	Energy	Crematorium	Total
2001	90.3	15.6	6.8	1.1	8.5	1.5	123.8
2003	81.7	16.8	7.4	1.2	8.4	2.5	118.0
2005	60.5	18.1	2.4	1.2	10.4	2.8	95.4
2007	45.5	22.7	8.4	0.5	9.2	2.5	88.8
2009	41.7	15.9	5.8	0.9	12.8	1.5	78.6
2011	44.5	12.1	6.7	0.7	12.2	1.9	78.1
2012	41.5	9.9	5.5	1.5	12.2	1.9	72.5
2013	40.6	7.5	5.4	1.9	13.4	2.5	71.3

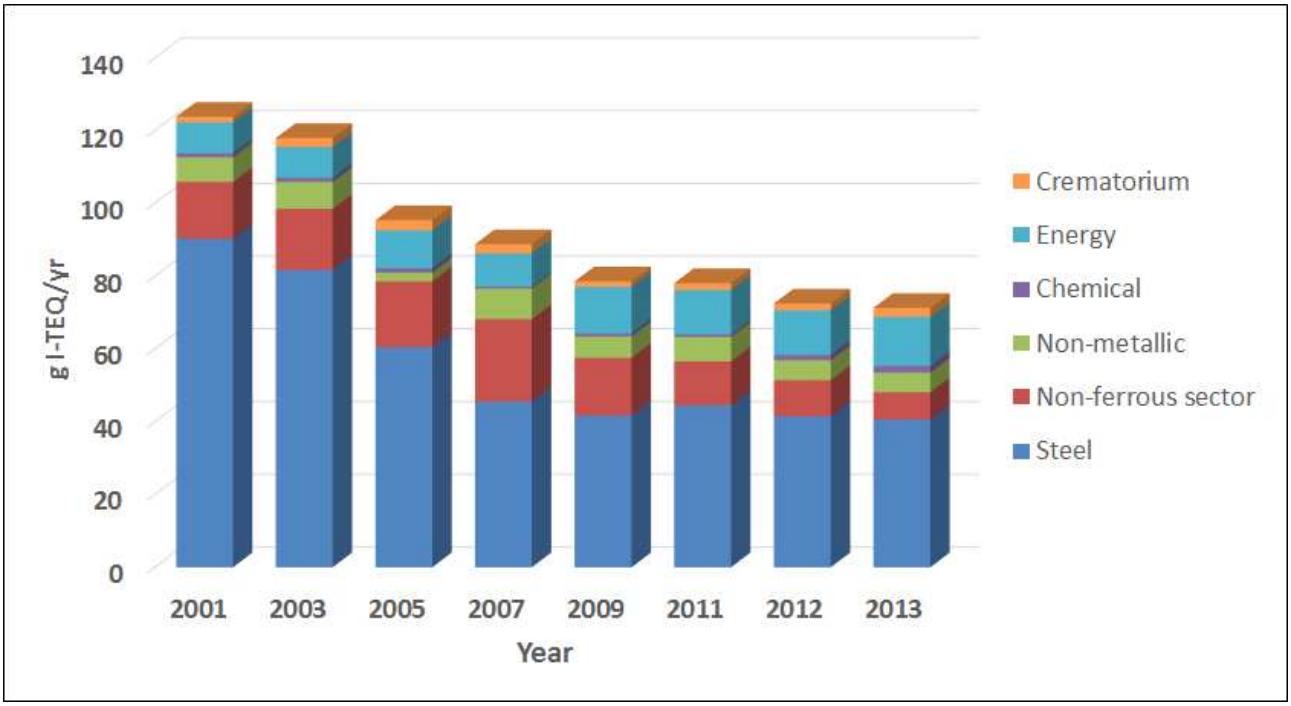

Fig 1. Emissions calculation procedure

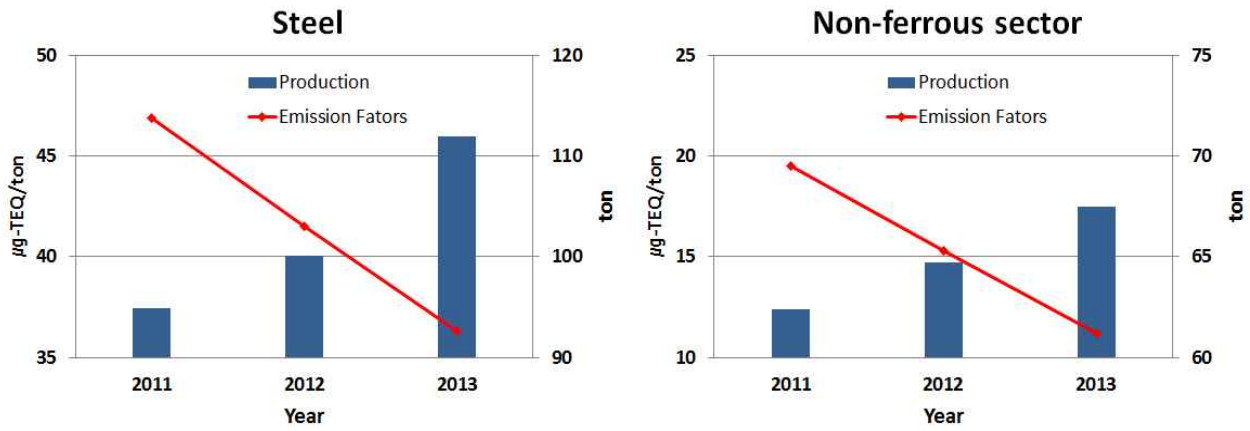

Fig 2. Relation of production and emission factors