

Seasonal methane emissions and recoveries from landfill sites of Republic of Korea

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Abstract

As of 2015 in Korea, GHG emissions from the SWDS (Solid Waste Disposal Sites) account for about 47% of the waste sector. Considering only the amount of CH₄ generated, that is approximately 30% of the annual emission of the entire country. And also, environmental changes are evident depending on the season, which is expected a lot affect the CH₄ generation mechanism in the landfill. Therefore, this study is carried out to improve the reliability and uncertainty of the estimation of CH₄ emissions from disposal sites.

In Korea, according to 'National GHG statistical Measurement, Reporting and Verification Guidelines (2017, GIR)', FOD (First Order Decay) model in the IPCC GPG 2000 is stipulated as the method of measuring the emissions from the landfill sites. As the activity data, on-site measurement and recovery data from 2012 to 2017 were applied.

As a result, CH₄ emissions from the venting wells are 19.9% higher in spring, 37.7% in summer than in autumn. Considering only methane in the recovered landfill gas, it is 2.1% higher in spring, 10.6% in summer than in autumn, but 14.8% less in winter.

There is some gap between emissions and recoveries, but the seasonal trend is recognized. It is important to consider that the recovered amount in winter is considerably lower than the other seasons, even though it is impossible to carry out the field measurement in winter due to the environmental constraints.

In additional studies, as well as securing more measurement data taking account of winter seasons, we need to take into account the other factors such as the differences in compaction and covering soil, weather, and the surrounding environment. Furthermore, as the DOC of the disposed waste decomposes over time, reduced emissions should be considered.