The Estimation of Emission Factors of CH_4 and N_2O by Measurement from the Biological treatment of Solid Waste

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Abstract

The purpose of this study is to estimate the emission factor of biological treatment facilities of solid waste. Using the NDIR, which is a continuous measurement methods, 3 biological treatment facilities, two are composting type “A” and “B”, the other is anaerobic digestion type “C”.

CH_4 average concentration measured from stacks in composting facility “A” was 37.23 ppm_v, and N_2O was 9.45 ppm_v. In the composting facility “B”, the average concentration of CH_4 from the stack was 24.92 ppm_v, and N_2O was 6.42 ppm_v. In the anaerobic digestion at biogas facility “C”, the average concentration of CH_4 from the stack was 118.18 ppm_v, and N_2O was 18.43 ppm_v.

Using measured concentrations, the emission amounts of CH_4 and N_2O from stacks per year were calculated. The results were 18.35 kg CH_4/day and 12.45 kg N_2O/day in the composting facility “A”, 6.81 kg CH_4/day and 4.67 kg N_2O/day in composting facility “B”, and 82.94 kg CH_4/day and 35.19 kg N_2O/day in anaerobic digestion facility “C”.

Finally, the emission factors of CH_4 in the composting type were calculated using the measured concentration and the amount of treated wastes, and was 0.19 g CH_4/kg wet waste in composting type facility “A”, 0.17 g CH_4/kg wet waste in composting type facility “B”, 0.96 g CH_4/kg wet waste in anaerobic digestion type facility “C”. Also, the emission factors of N_2O were found to 0.13 g N_2O /kg wet waste in composting type facility “A”, 0.12 g N_2O /kg wet waste in composting type facility “B”, 0.41 g N_2O /kg wet waste in anaerobic digestion type facility “C”.

We know that in composition type, the emission factors of CH_4 are 20 times less than default factor for CH_4 emission from biological treatment for Tier 1 method(IPCC guideline), and the emission factors of N_2O are 3 times less than default factor. In anaerobic digestion at biogas facilities type, the emission factor of CH_4 is similar to default factor, but the emission factor of N_2O is 10 times higher than Germany and the Netherlands.