

Determination of Non-CO2 Greenhouse Gas Emission in Electronics Industry

Authors : Bong Jae Lee, Jeong Il Lee, Hyo Su Kim

Abstract : Both developed and developing countries have adopted the decision to join the Paris agreement to reduce greenhouse gas (GHG) emissions at the Conference of the Parties (COP) 21 meeting in Paris. As a result, the developed and developing countries have to submit the Intended Nationally Determined Contributions (INDC) by 2020, and each country will be assessed for their performance in reducing GHG. After that, they shall propose a reduction target which is higher than the previous target every five years. Therefore, an accurate method for calculating greenhouse gas emissions is essential to be presented as a rational for implementing GHG reduction measures based on the reduction targets. Non-CO2 GHGs (CF4, NF3, N2O, SF6 and so on) are being widely used in fabrication process of semiconductor manufacturing, and etching/deposition process of display manufacturing process. The Global Warming Potential (GWP) value of Non-CO2 is much higher than CO2, which means it will have greater effect on a global warming than CO2. Therefore, GHG calculation methods of the electronics industry are provided by Intergovernmental Panel on climate change (IPCC) and U.S. Environmental Protection Agency (EPA), and it will be discussed at ISO/TC 146 meeting. As discussed earlier, being precise and accurate in calculating Non-CO2 GHG is becoming more important. Thus this study aims to discuss the implications of the calculating methods through comparing the methods of IPCC and EPA. As a conclusion, after analyzing the methods of IPCC & EPA, the method of EPA is more detailed and it also provides the calculation for N2O. In case of the default emission factor (by IPCC & EPA), IPCC provides more conservative results compared to that of EPA; The factor of IPCC was developed for calculating a national GHG emission, while the factor of EPA was specifically developed for the U.S. which means it must have been developed to address the environmental issue of the US. The semiconductor factory 'A' measured F gas according to the EPA Destruction and Removal Efficiency (DRE) protocol and estimated their own DRE, and it was observed that their emission factor shows higher DRE compared to default DRE factor of IPCC and EPA Therefore, each country can improve their GHG emission calculation by developing its own emission factor (if possible) at the time of reporting Nationally Determined Contributions (NDC).
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Keywords : non-CO2 GHG, GHG emission, electronics industry, measuring method

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