

Executive Summary of Inventorization of Green House Gases – Sources and Sinks in Delhi

Sponsored by Department Of Environment, Government of Delhi

The projected population of Delhi for the year 2015 is close to 20 million. Due to different cultural habits and higher population density, the capital has become an interesting study site for understanding major issues of 'environmental consequences due to urbanization.' This Project is an attempt to prepare a greenhouse gases emissions inventory for Delhi which will help in developing baseline information on emission levels and identifying major sources and sectoral contributions.

Two broad objectives have been considered for this study viz. GHG inventorization and Carbon map preparation. To fulfill these objectives, estimation has been done using two approaches: top-down and bottom-up; using IPCC Tier 1 Methodology.

In top-down approach, emissions have been calculated based upon fuel and electricity consumption in source sectors of Delhi. In case of bottom-up approach, emission estimation was calculated at the unit level such as from single household for the domestic sector or emissions from different categories of vehicle for the transport sector. On-site monitoring of GHGs was also carried out at 64 sites across Delhi using CO₂ and CH₄ automatic analyzers (Aeroqual, Series 500, New Zealand).

CO₂ emission from the road transport sector for the year 2007-08 is estimated to be 7.66 MMT using the top-down approach, whereas using the bottom-up approach it was estimated to be 8.17 MMT. The variation in the emission using the two approaches is very less. In the generated data, ambient CO₂ concentration varies from 484 to 587 ppm. The trend is directly proportional to the traffic volume with maximum concentration in the morning peak hour from 9:30 to 10:30 am. Delhi has five thermal power plants (TPP) which serve as a major point source of CO₂ emissions in the city. Out of these, three are coal based while two are gas based power plants. The total CO₂ emission from these thermal plants in the year 2007-2008 was 9.76 MMT. Average specific CO₂ emissions are higher for coal based power plants as compared to gas based TPP. Recently, the I.P Station power house plant has been closed down owing to very large emissions.

As it is true for most of the metropolitan cities in developing countries, Delhi is also plagued with issues of proper settlement and housing. Pollution from domestic sector is mainly due to use of kerosene, LPG, diesel (DG sets) and huge consumption of electricity. LPG is the most commonly used cooking fuel (68.4%) followed by kerosene (24.4%) while biomass is also used in 3.9% households. Average CO₂ emission from domestic sector of Delhi in the year 2000-2008 was 4.56 MMT whereas in the year 2007-08, it was 5.35 MMT. Although biomass is used as a cooking fuel, it is carbon neutral and therefore its contribution to the total CO₂ emissions has not been included in this approach.

CO₂ emission from the industries of Delhi was 1.37 MMT with power consumption alone contributing 1.21 MMT while contribution from fossil fuel combustion in industrial processes was 0.01 MMT and contribution from DG set (operation in industrial area) was estimated to be 0.15 MMT. Average concentration of CO₂ monitored at the industrial areas ranged from 512 to 559 ppm.

Estimated CO₂ emissions from commercial sector of Delhi were 1.87 MMT with power consumption alone contributing 1.69 MMT. Contribution from the combustion of fossil fuel in the DG sets was 0.177 MMT.

Presently the solid waste is being dumped at three landfill sites which fall under the category of uncontrolled disposal facilities and have no gas recovery systems in place. Landfill gas generation comprises mainly of methane which has a global warming potential of 21. Default method has been used to estimate methane generation from three landfill sites of Delhi. During 2008, the highest contribution of methane (52%) was emitted from Bhalswa. IPCC FOD method cannot be used for GHG estimation because of unavailability of data.

A Carbon map of Delhi (in terms of tones of carbon emission per square kilometer) was prepared by using the NAEI Mapping Method, 2006. One square kilometer resolution map represents emission at

the location called “emission at source” (e.g. power station), whereas emission distributed to location (electricity) known as “end users”. CO₂ concentration map of Delhi shows ambient concentration ranging from 491 ppm (village areas of South West District) to 625 ppm in the unauthorized colonies.

Since the Carbon map is an end user map, it has excluded the emission from thermal power plants and is mainly focused on four sectors (transport, domestic, commercial and industrial). The carbon map shows that these four main sectors emit 15.41 MMT of greenhouse gas per annum. In comparison to the city of London, with a total carbon emission of 44 MMT, Delhi’s carbon emission is one-third of it. In Delhi, transport (46%) and the domestic sector (34%) are the biggest contributors to greenhouse gas emissions. Thus there is an urgent need to introduce policy measures to cut down emissions from these sectors. Based on the carbon map, various policy measures have been recommended in the report.