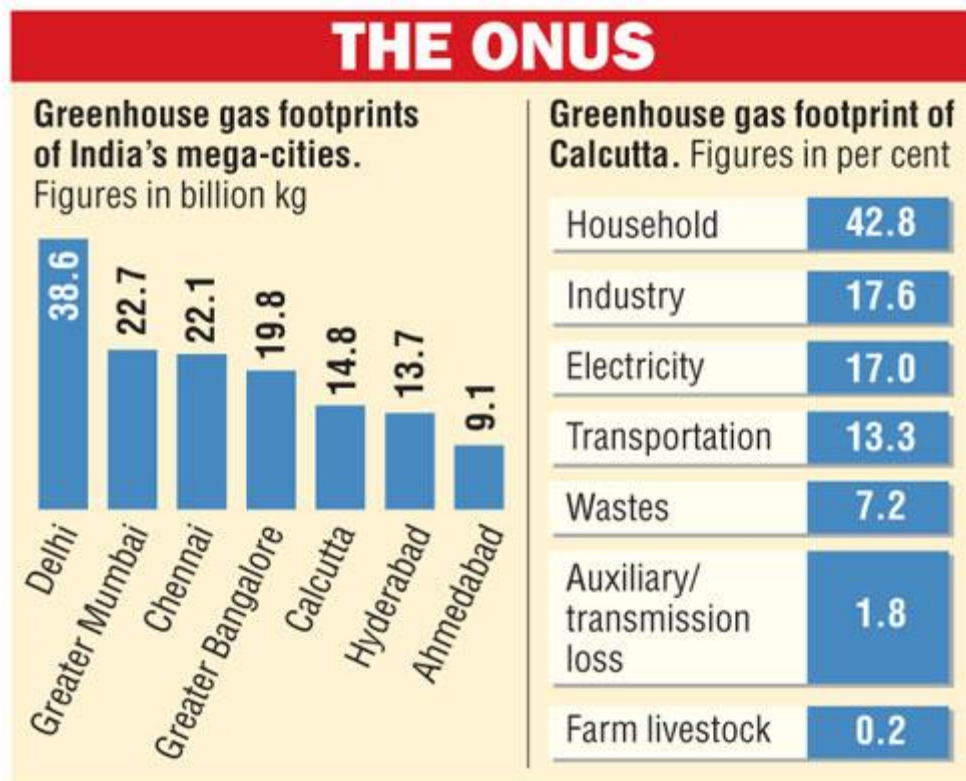


Your high-rise is warming the globe - Household emission tops Calcutta list

G.S. Mudur

New Delhi, March 17: High-rise and glass-facade buildings, poor garbage management and inefficient heating practices have turned urban households into major collective sources of greenhouse gases (GHG), scientists have said after the first assessment of GHG footprints of India's mega-cities.

The researchers at the Indian Institute of Science (IISc), Bangalore, have found that urban households account for unexpectedly high proportions of the GHG emissions of cities, with Calcutta's domestic sector at the top, contributing over 42 per cent of the city's GHG footprint. (See chart)



Greenhouse gases such as carbon dioxide, methane and nitrous oxide in the atmosphere absorb heat from the Sun and are contributing to global warming.

The study has identified Delhi as the worst polluting metropolis - it released over 38 billion kg of GHG during 2009, the latest year for which pooled emissions data is available, followed by Greater Mumbai which spewed 22.7 billion kg, and Chennai with 22.1 billion kg.

The researchers say Calcutta's 19 billion kg footprint could be because of a mix of several factors - from lower levels of industrial activities to the greater use of public transport which would lower transport-related emissions.

While GHG emissions have long been linked mainly to transportation, power plants and industrial activities, the researchers found that the GHG emissions from the domestic sector ranged from 17 per cent in Hyderabad to 42 per cent in Calcutta.

"This may seem like a surprise, but not when we take into account the changing architecture of our cities and our mismanagement of cities' solid and liquid wastes," T.V. Ramachandra, a faculty member at the IISc Centre for Ecological Sciences, told **The Telegraph**.

The study by Ramachandra and his colleagues at the IISc's Centre for Energy and Wetlands Research provides insights into the GHG emissions of cities sector by sector and is expected to help government departments and policymakers identify priority areas for actions to curb emissions.

The domestic GHG emissions emerge from everyday energy consumption by households through cooking, lighting, heating and the use of household appliances. The researchers say there are indications that changing architectural trends are dramatically increasing domestic GHG emissions.

"High-rise apartments and buildings with glass facades tend to raise electricity consumption," said Bharath Aithal, a post-doctoral research scholar at the IISc and member of the study team. "Elevators, water pumps, apartments sealed off by glass windows - all of this contributes to emissions."

The researchers have observed that electricity consumption in areas of a city with a high proportion of traditional houses is on average about 1,700 units per person per year but jumps to between 12,000 and 15,000 units per person per year in areas with high-rise buildings with glass facades.

Their study, published in the journal *Renewable and Sustainable Energy Reviews*, also shows how poor public transportation networks can influence a city's GHG footprints. Calcutta's transportation sector accounts for 13 per cent of the city's GHG emissions while Greater Mumbai's transportation GHG footprint is about 17 per cent.

"Both these cities have relatively better public transportation systems than Delhi or Bangalore - where the GHG emissions from transportation is much higher," said Aithal. The GHG emission from transportation was 32 per cent in Delhi, 43 per cent in Bangalore and 56 per cent in Hyderabad.

Scientists not associated with the study said it could identify sectors for action but cautioned that a city's GHG footprints should not be viewed in isolation of the economic relevance of the city.

"Cities are hubs of job creation and wealth production," Thiagarajan Jayaraman, professor and dean at the School of Habitat Studies at the Tata Institute of Social Sciences, Mumbai, told this newspaper. "The social and economic relevance of cities should be taken into account while assessing their GHG footprints."

The study has for the first time also assessed emissions from city wastes - primarily methane released during the bacterial degradation of organic matter. The waste-related emissions range from three per cent of Chennai's GHG footprint to about eight per cent of Greater Mumbai's GHG footprint.

"These may appear small numbers, but methane has a 21-fold stronger greenhouse effect than carbon dioxide," said Ramachandra. "Our cities are still not managing their garbage and sewage the way these wastes should be handled."

Experts estimate that about 60 per cent to 70 per cent of domestic and municipal garbage contains organic matter that ideally needs to be segregated and processed separately for conversion into manure. Instead, most cities dump solid wastes into landfills that become a source of methane. And while all cities have sewage treatment facilities, Ramachandra said, they are not sufficient to manage the volumes of sewage the cities generate.

The researchers say the GHG emissions from the domestic sector also emerge from households that rely on inefficient ways of heating water. "Many urban households continue to heat water using LPG stoves," said Aithal.

A climate change specialist in the US said the study could help cities set targets for themselves. "It illustrates sector by sector, opportunities that cities could act on," said Pankaj Bhatia, deputy director of the Climate Program at the World Resources Institute, Washington DC. "Cities could consider using initiatives such as the Clean India Campaign or plans to expand renewable energy to curb their GHG emissions."

"Lower emissions would be a co-benefit of the Clean India Campaign."