Title:	Air pollution scenario analyses of fleet replacement strategies to accomplish reductions in criteria air pollutants and 74 VOCs over India
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Abstract:	Traffic emissions are a major source of air pollution and associated damage to human health in India. Many of the Indian metro cities urgently require cleaner transportation technologies to ensure cleaner air. Here, using newly compiled spatially disaggregated, gridded, high-resolution (0.1° × 0.1°) road transport emission inventory for India for 2030 (RTEII) of 74 speciated VOCs, CO, SO2, NOx, NH3, CH4, CO2, BC, OC and PM2.5 from varied fuels and vehicle technologies that are currently in use in India, we investigated changes in emission in response to substitution of the existing vehicular fleet by cleaner alternatives. Three “what-if” intervention scenarios were considered to assess the extent in improvement of air quality due to the reduction in the primary emission of air pollutants. The results show that significant reductions in direct emission of pollutants (Non-Methane VOCs, −91%; CO, −80%; PM2.5, 44%) including toxic VOCs (e.g., isocyanic acid, −76%; BTEX, −93%; as well as individual VOC classes (e.g., sum of OVOCs, −61% and sum of alkenes, −80%) can likely be achieved in 2030 by shifting from highly polluting Internal Combustion Engine (ICE) based 2 and 3-wheeled vehicles to Electric Vehicles (EVs) under scenario 1. The amount of secondary pollutants such as SOA and O3 that can potentially be formed from traffic also showed significant reduction of 94% and 84%, respectively, under scenario 1. Conversion of diesel fuelled vehicles to CNG under scenario 2 can lead to a larger reduction in black carbon emissions (−50%). Scenario 3, in which the benefits of scenarios 1 and 2 are combined, represents the best long-term strategy moving forward, which can result in massive emission reductions of pollutants through existing technologies of greener transport fleets over India. Large scale conversion of the vehicle fleets as explored here can lead to a substantial reduction of air pollution and fewer lives lost.
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