

Particulate Matter Source Contributions for Raipur-Durg-Bhilai Region of Chhattisgarh, India

SUPPLEMENTARY MATERIAL

Uncertainty in the Emissions

Since, the inventory is based on bottom-up activity data in the city and secondary information on emission factors, mostly from the studies conducted in India and Asia, it is difficult to accurately measure the uncertainty in our estimates. In the transport sector, the largest margin is in vehicle km traveled and vehicle age distribution with an uncertainty of $\pm 20\%$ for passenger, public, and freight transport vehicles. The silt loading, responsible for road dust resuspension, has an uncertainty of $\pm 25\%$, owing to continuing domestic construction and road maintenance works. In the brick manufacturing sector, the production rates which we assumed constant per kiln, has an uncertainty of $\pm 20\%$. The data on fuel for cooking and heating in the domestic sector is based on national census surveys with an uncertainty of $\pm 25\%$. Though lower in total emissions, open waste burning along the roads and at the landfills has the largest uncertainty of $\pm 50\%$. The fuel consumption data for the in-situ generator sets is obtained from random telephone surveys to hotels, hospitals, large institutions, and apartment complexes, with an uncertainty of $\pm 30\%$.

Table S1: Assumed growth rates for projecting total emissions for non-transport sectors.

| | Pop-based | DGsets | Industries | Construction | Air-Travel |
|------|-----------|--------|------------|--------------|------------|
| 2015 | | | | | |
| 2016 | 1.15% | 7.4% | 6.2% | 3.0% | 6.6% |
| 2017 | 1.16% | 7.5% | 6.0% | 3.0% | 6.5% |
| 2018 | 1.17% | 7.6% | 5.5% | 3.0% | 6.4% |
| 2019 | 1.18% | 7.7% | 5.0% | 3.0% | 6.3% |
| 2020 | 1.19% | 7.8% | 4.5% | 3.0% | 6.2% |
| 2021 | 1.20% | 7.9% | 4.0% | 3.0% | 6.1% |
| 2022 | 1.21% | 8.0% | 3.5% | 2.0% | 6.0% |
| 2023 | 1.22% | 8.1% | 3.0% | 2.0% | 5.9% |
| 2024 | 1.23% | 8.2% | 3.0% | 2.0% | 5.8% |
| 2025 | 1.24% | 8.4% | 3.0% | 2.0% | 5.7% |
| 2026 | 1.25% | 8.8% | 3.0% | 2.0% | 5.6% |
| 2027 | 1.26% | 9.2% | 3.0% | 2.0% | 5.5% |
| 2028 | 1.27% | 9.6% | 3.0% | 2.0% | 5.4% |
| 2029 | 1.28% | 10.0% | 3.0% | 2.0% | 5.3% |
| 2030 | 1.29% | 10.0% | 3.0% | 2.0% | 5.2% |

Table S2: Assumed growth rates for projecting total emissions for transport sectors.

| | 2Ws | Cars | MUVs | Taxis | 3Ws | Buses | H DVs | LDVs | T&T |
|------|-------|-------|-------|-------|------|-------|-------|------|------|
| 2015 | | | | | | | | | |
| 2016 | 10.0% | 10.0% | 10.0% | 7.0% | 7.0% | 2.0% | 2.0% | 3.0% | 3.0% |
| 2017 | 8.0% | 9.7% | 9.7% | 6.5% | 6.5% | 2.0% | 2.0% | 3.0% | 3.0% |
| 2018 | 7.9% | 9.4% | 9.4% | 6.3% | 6.3% | 2.0% | 2.0% | 3.1% | 3.1% |
| 2019 | 7.7% | 9.1% | 9.1% | 6.1% | 6.1% | 2.1% | 2.1% | 3.1% | 3.1% |
| 2020 | 7.5% | 8.9% | 8.9% | 5.9% | 5.9% | 2.1% | 2.1% | 3.2% | 3.2% |
| 2021 | 7.2% | 8.6% | 8.6% | 5.8% | 5.8% | 2.2% | 2.2% | 3.2% | 3.2% |
| 2022 | 7.0% | 8.3% | 8.3% | 5.6% | 5.6% | 2.2% | 2.2% | 3.3% | 3.3% |
| 2023 | 6.8% | 8.2% | 8.2% | 5.4% | 5.4% | 2.3% | 2.3% | 3.4% | 3.4% |
| 2024 | 6.6% | 8.0% | 8.0% | 5.3% | 5.3% | 2.3% | 2.3% | 3.4% | 3.4% |
| 2025 | 6.4% | 7.8% | 7.8% | 5.1% | 5.1% | 2.3% | 2.3% | 3.5% | 3.5% |
| 2026 | 6.2% | 7.7% | 7.7% | 4.9% | 4.9% | 2.4% | 2.4% | 3.6% | 3.6% |
| 2027 | 6.0% | 7.5% | 7.5% | 4.8% | 4.8% | 2.4% | 2.4% | 3.7% | 3.7% |
| 2028 | 5.8% | 7.4% | 7.4% | 4.6% | 4.6% | 2.5% | 2.5% | 3.7% | 3.7% |
| 2029 | 5.7% | 7.2% | 7.2% | 4.5% | 4.5% | 2.5% | 2.5% | 3.8% | 3.8% |
| 2030 | 5.5% | 7.1% | 7.1% | 4.4% | 4.4% | 2.6% | 2.6% | 3.9% | 3.9% |

(2Ws = two wheelers including scooters; MUVs = multi-utility vehicles; 3Ws = passenger three wheelers (auto-rickshaws); HDVs = heavy duty vehicles; LDVs = light duty vehicles; T&T = tractors and trailers)

Figure S1: Summary of key meteorological parameters – (a) temperature, (b) mixing height, (c) wind direction and (d) wind speed

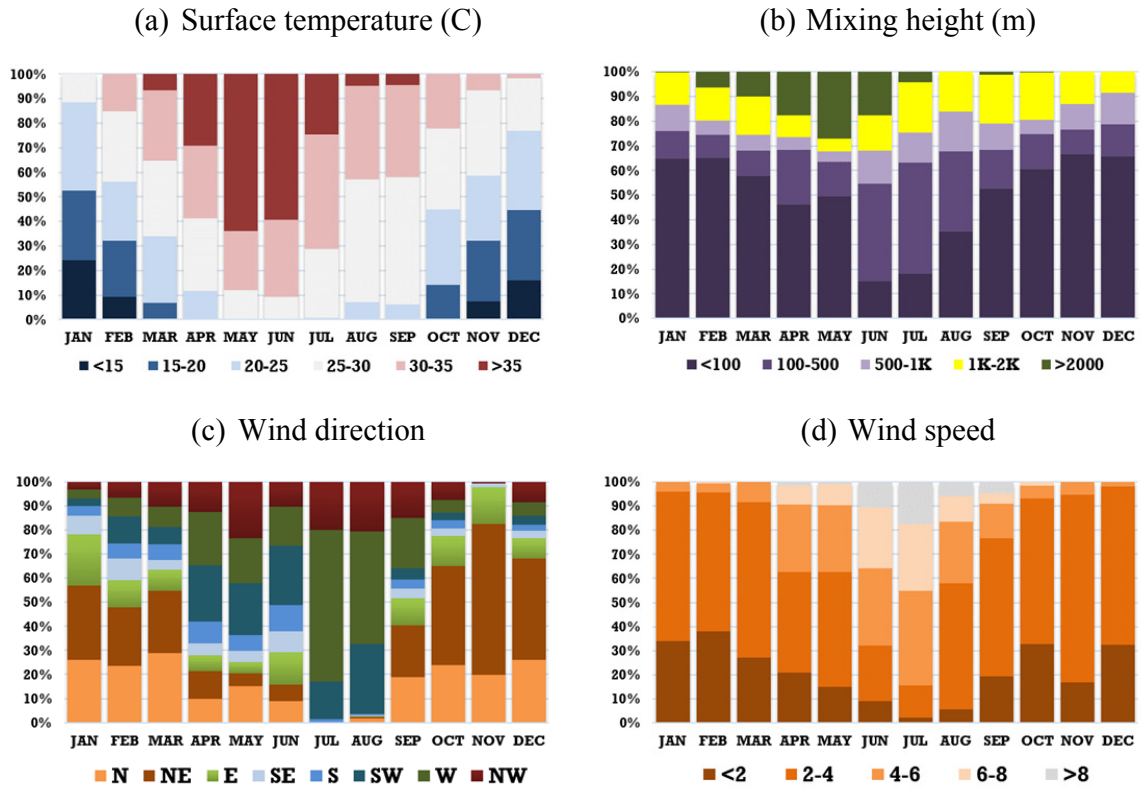


Figure S2: Percentage source contributions to modeled ambient PM_{2.5} concentrations over Raipur-Durg-Bhillai region of Chhattisgarh, India

