

Control of Indoor Carbon through Soft Approaches in Himachal Pradesh, India

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Abstract : The mountainous regions are very crucial for a country because of their importance for weather, water supply, forests, and various other socio-economic benefits. But the increasing population and its demand for energy and infrastructure have contributed very high loadings of air pollution. Various activities such as cooking, heating, manufacturing, transport, etc. contribute various particulate and gaseous pollutants in the atmosphere. This study was focused upon indoor air pollution and was carried out in four rural households of the Baggi village located in the Hamirpur District of the Himachal Pradesh state. The residents of Baggi village use biomass as fuel for cooking on traditional stove (Chullah). The biomass types include wood (mainly Beul, Grewia Optiva), crop residue and dung cakes. This study aimed to determine the organic carbon (OC), elemental carbon (EC), major cations and anions in the indoor air of each household. During non-cooking hours, it was found that the indoor air contained OC and EC as low as $21\mu\text{g}/\text{m}^3$ and $17\mu\text{g}/\text{m}^3$ respectively. But during cooking hours (with biomass burning), the levels of OC and EC were raised significantly by 91.2% and 85.4% respectively. Then the residents were advised to switch over as per our soft approach options. In the first approach change, they were asked to prepare the meal partially on Chullah using biomass and partially with liquefied petroleum gas (LPG). By doing this change, a considerable reduction in OC (53.1%) and in EC (41.8%) was noticed. The second change of approach included the cooking of entire meal by using LPG. This resulted in the reduction of OC (84.1%) and EC (73.3%) as compared to the values obtained during cooking entirely with biomass. The carbonaceous aerosol levels were higher in the morning hours than in the evening hours because of more biomass burning activity in the morning. According to a general survey done with the residents, the study provided them an awareness about the air pollution and the harmful effects of biomass burning. Some of them correlated their ailments like weakened eyesight, fatigue and respiratory problems with indoor air pollution. This study demonstrated that by replacing biomass with clean fuel such as LPG, the indoor concentrations of EC and OC can be reduced substantially.

Keywords : biomass burning, carbonaceous aerosol, elemental carbon, organic carbon, LPG

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