This study was designed to provide a preliminary evaluation of the possible effects of haze in plastic lenses of headlamps on the performance of low-beam headlamps. The approach was to simulate the effects of haze by applying Gaussian (normal) spread functions to each point of a beam pattern. The simulation used actual photometry from a U.S. headlamp and a European headlamp. The measure of interest was the percentage change, at each point in the beam pattern, of the luminous intensity with haze compared to the luminous intensity without haze. Seven levels of haze were simulated: 1, 3, 5, 7, 10, 20, and 30%.

The results of the simulation suggest that even the smallest amount of haze tested may produce major changes in both the visibility and glare illumination provided by low-beam headlamps. However, these are tentative findings that need to be interpreted with caution. There are two main reasons for the caution: First, the assumption that the effects of haze follow Gaussian distribution needs to be validated. Second, the potential contribution of the optics in the lenses was disregarded in the present simulation. The influence of the optics would need to be assessed before accepting the present results as generally applicable. Because of these concerns, no quantitative recommendation can be made from the present research for a maximum level of haze.

The main conclusion of this study is that haze of considerably less than 30% has the potential to be a major factor in the performance of headlamps with plastic lenses. Further research is needed to clarify the haze effects of actual headlamps.