

The Sustainable Highway for Environmentally Constrained Urbanized Areas

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Summary

The ‘Sustainable Highway’ concept offers an integrated solution to motorway emission and noise problems. It consists of a motorway canopy made of cold-bendable laminated glass. Key factors here are durability, safety, cost and revenue. The design yields a significant reduction in noise, fine particulates, NO_x, and CO₂ and also in the use of fossil fuels. It also reduces the infrastructure footprint, freeing up building land in urban environments. The Sustainable Highway makes it possible to increase road capacity, boosts urban accessibility and supports government policy aimed at concentrating new building possibilities in urban environments.

Special attention will be given in this paper to a possible structural system of the highway canopy and to the costs and benefits of the concept, compared with a highway with sound barriers.

Keywords: sustainability, canopy, highway, steel, glass, urbanism, noise, emission, energy production, building land

1. Introduction

Air pollution is high on the political agenda worldwide. Emissions have to be reduced. Tighter legislation is making noise emission control and acceptable air quality increasingly important when it comes to obtaining environmental permits for new or expanding infrastructure, especially in densely populated, urbanized areas.

The ‘[Sustainable Highway](#)’ concept offers an integrated solution to these problems [1]. It consists of a motorway canopy made of cold-bendable laminated glass (Fig. 1).



Fig. 1: Motorway canopy, here merging into noise barriers

Key factors here are durability, safety, cost and revenue. The design yields a significant reduction in noise, fine particulates, NO_x and CO₂. The air is cleansed of fine particulates and nitrogen oxide emitted by the vehicles before it escapes at the canopy ends. Furthermore, solar cells may be incorporated into the glass to produce clean energy. The excess heat that accumulates in the summer is stored in the groundwater and used to heat the asphalt in the winter. This still leaves plenty of heat for such purposes as domestic heating, thus helping to reduce CO₂ emissions. Furthermore, biofuel can