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Why is the impact of road user charging on the environment important?

“Sustainable transport” and “sustainable mobility” are key concepts in transport policy making, pointing to the need to integrate environmental concern with other aspects (social, economic) in all transport related decisions. The relation between urban road user charging and environmental issues is close and twofold. First, with an appropriate design, road user charging schemes can be used to help tackle several of the environmental problems that are caused by traffic (also in those cases where charging is introduced primarily for congestion reasons). Secondly, public environmental concern may increase the acceptability of road user charging generally.

What is currently known about the environmental effects of road user charging?

Central environmental qualities that may be directly affected by the changes in traffic patterns following the introduction of road user charges are:

- **Green-house gas reductions.** Any urban RUC

scheme designed to reduce vehicle mileage in the charged area will reduce CO₂ emissions proportionately. In the Stockholm trial, the overall reduction of vehicle mileage was estimated to be 14 % within the charging cordon, and 3 % in the county (regional level). The reductions obtainable from local urban RUC are considerable compared to other potential local-regional policy measures.

- **Local air quality and health.** The health effects of pollutants can range in severity from death to minor illnesses and discomfort. As with greenhouse gases, reductions in vehicle mileage and emission factors are important contributions for health effects of local air quality. In addition, reductions appear where people are most exposed. In Stockholm, immissions of PM₁₀ fell by 6 % during the trial. In London, total NO_x emissions were estimated to have decreased by 12 % within the zone, while there was a corresponding increase in the inner ring road by 1.5 %.
- **Noise.** In principle, reducing traffic volume is the most efficient way to reduce traffic noise disturbance. However, there is a problem in that very large reductions in traffic are necessary for the noise reduction to be noticeable to the ear. A halving of traffic is experienced as a just-about-noticeable decrease in noise. But the degree to which people are disturbed



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by traffic noise is highly individual. The traffic reductions achieved in the Stockholm trial led to an average reduction in noise of approximately 1 dB(A).

- **Urban quality.** Urban quality, for example the ability to take a pleasant walk with clean air in a well managed urban environment, can heavily influence the attractiveness of an area or region. However, the attempts to measure these qualities by objective criteria in Stockholm and London were less successful, and did not give a clear indication that liveability had improved overall.

In addition to the above mentioned four environmental qualities directly affected by pricing, urban road user charging schemes may also have indirect effects on car fleet composition and demand for new infrastructure. Furthermore, central factors that contribute to positive environmental effects are (in order of importance):

- 1 An overall reduction of traffic
- 2 Reduction of traffic where there are a lot of people and in densely built-up areas
- 3 Making traffic run more smoothly.

What further research is needed?

Further research is needed on for example the effects that driving characteristics have on the environment. There is a general assumption that reducing congestion (less stop-and-go, more “smooth” driving) is important to improve urban air quality. The limited research in this area seems less conclusive. Also there is a need to combine analyses of short term adaptation to charging, and long term decisions with respect to car ownership. Only on the basis of such a combined analysis would it be possible to identify reasonably “optimal” combined strategies with respect to charging exemptions (or reductions) for green cars, other types of economic incentives for car fleet transition, and charging effectiveness.

What can we conclude at present?

We can conclude that there is reason to consider road user charging not only from a congestion perspective, but also based on an environmental point of view. When it comes to formulating and implementing a charging scheme in practice there will in most cases be more synergy than conflicts between the two objectives. A combination of the two has been shown to be one of the major determinants of public acceptance for charging. The following DO's and DON'Ts should help to increase the likelihood of a successful road user charging implementation.

DOs

Consider charging with respect to the full aspects of externalities, e.g. differentiating charges over 24 h, considering several environmental aspects

Consider exemptions for low emission vehicles in order to stimulate car fleet transition

Ensure that road user charging reduces environmental problems rather than simply redistributing them. Such redistributions can be compensated by mitigating measures

DON'Ts

Avoid over-complex charging structures, even if they appear justified on environmental grounds.

Do not subsidize “green cars” or make exemptions to the extent that it will counteract the efficiency of reducing congestion.