

Summary:

An Assessment of the Potential Impacts on Road Safety of Traffic Warning Systems

Traffic Warning Systems is a Norwegian company which has developed a system for warning drivers of traffic hazards. The system is radio based. Warnings are given in the form of a flashing light on the dashboard. Different colours of the flashing light can be used to indicate different hazards. The range of the system is at least 500 metres. To benefit from the system, each motor vehicle must have a radio that can transmit and receive the warning signals. The system is activated by pushing a transmit button.

This report gives an assessment of the potential impacts on road safety of a universal application of this warning system by all motor vehicles in Norway. The types of traffic hazards the system is intended to cover are:

- Emergency vehicles on duty (ambulances, fire engines, police cars)
- Stationary or slow moving road works
- Trains approaching unprotected grade crossings with highways
- Disabled vehicles, left on the road shoulder in cases of engine failure, flat tire, or some other problem
- Pile up accidents, that is accidents in which three or more vehicles are involved.

The number of accidents that can be related directly to these traffic hazards was estimated on the basis of official Norwegian accident statistics, covering police reported injury accidents. The mean annual number (1995-1999) of injury accidents that can, in principle, be influenced by Traffic Warning Systems was estimated to about 600. Of these 520 were pile up accidents.

It is, however, unlikely that a warning system could prevent a large amount of pile up accidents. The dynamics of this type of accident is such that the pile up takes place very quickly, in most cases much too quickly for the driver to have the time to react to any warning. The only category of pile up accidents for which a warning system is likely to be effective, are those that happen under restricted sight conditions. Restricted sight conditions include darkness on unlit roads, and poor sight conditions due to fog, rain or snow. When sight conditions are restricted, it is conceivable that the third, fourth, and so on vehicle arriving at an accident scene fails to detect the accident in time to avoid becoming involved in it. A warning could then be effective.

If pile up accidents in restricted sight conditions are regarded as the only type of pile up accident that can be prevented by a warning system, the annual number of injury accidents that can be affected by Traffic Warning Systems comes to 115. In these accidents 213 people are killed or injured.

It has been estimated that, if all motor vehicles (except mopeds, snow scooters and motorcycles) in Norway had the warning system, the following number of injured road users could be prevented each year:

- 5 fatal injuries
- 2 very serious injuries
- 8 serious injuries
- 60 slight injuries

The total comes to 76 killed or injured road users per year. In addition, it was estimated that about 266 property-damage-only accidents can be prevented each year.

The possibility of road user behavioural adaptation to the system, offsetting in part or in full the estimated safety benefits, is discussed. One form of behavioural adaptation could be that the system is ignored if the warnings come on too frequently, for no immediately apparent reason. It is concluded that although behavioural adaptation cannot be ruled out, it is very improbable that any changes in behaviour induced by the system would completely eliminate the estimated gains in safety.

A cost-benefit analysis of introducing the system for all motor vehicles in Norway has been performed. The costs of installing the system in all motor vehicles come around 890 million NOK (1 NOK = 0.1208 EURO). The best estimate of the benefits, converted to monetary terms, is about 1,150 million NOK. This estimate relies on official estimates of road accident costs in Norway. Benefits are greater than costs. The system is based on supplying electricity by means of a battery. If many vehicle owners fail to change batteries on time, the benefits of the system may become smaller over time. The estimates above presume 100% compliance with the system. In practice it may prove difficult to reach such a high level of compliance.