In the Nordic countries of Europe the major part of freight transportation occurs with vehicles, which are composed of a truck and a trailer. Their gross combination mass is 60 tons and their length is 25.25 m. Their payload is more than 40 tons. In Finland and Sweden they operate on all roads, while in Norway and Denmark their operation is limited on certain road sections. In other countries of the European Union (except the Netherlands) the maximum mass is normally 40 tons and the maximum length is 18.75. The maximum payload of those vehicles is 25 tons.

The purpose is to decrease fuel consumption, variable vehicle operating costs and pollutant emissions. The higher the vehicle mass the lower are these parameters calculated per the transport product unit [ton*kilometers]. The road wear also will be decreased, when the vehicle size increases. The road pavement dimensioning and the road wear are determined by the number of Equivalent Single Axle Loads [ESAL]. Each axle load is converted to the equivalent single axle load (10 tons) by taking account characteristics of axle groups (bogies) and single wheels (for example AASHO Road Tests).

When increasing the vehicle size (mass) the number of axles is increased rather than exceeding the present existing axle loads. Simultaneously the need of the number of vehicles is also decreased, and thus the road wear is decreased.

The method is a computer simulation system, which is based on vehicle dynamics, engine maps of fuel and pollutant emissions, other technical characteristics of vehicles and roads as well as driving technique (target speed/gear shift strategy). The simulation system has been validated by field measurements on roads.

The fuel consumption as well as the pollutant emissions are very sensitive to the road topography and speed, and therefore several road types and target speeds are included in the final paper.

The pollutant emissions in the paper are nitrogen oxides (NOx), carbon monoxide (CO), hydro carbons (HC), particulate matters (PM) and carbon dioxide (CO2). The computer simulation system is also described briefly in the final paper.

It was found that all parameters reach better values, when the vehicle size increases.