

## Emissions and Speed Limit Literature Review

The impact of reducing the maximum speed limit on motorways in Switzerland to 80 km h<sup>-1</sup> on emissions and peak ozone

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Environmental Modelling & Software  
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Abstract

Hot and dry conditions in summer 2003 led to ozone levels that substantially exceeded the Swiss ambient air quality standard. We investigated how emissions and ozone levels would have changed in this period if the maximum speed limit on Swiss motorways were decreased from 120 to 80 km h<sup>-1</sup>. The air quality model package MM5/CAMx was applied to two nested domains, both including Switzerland. Anthropogenic emissions were based on various European and Swiss data sources. The simulations for the reference case were based on current driving behaviour. In the reduction case, nitrogen oxides (NO<sub>x</sub>) emissions from road traffic were lower by about 4% with respect to the current total NO<sub>x</sub> release. Emissions of volatile organic compounds (VOC) were not significantly affected. The peak ozone levels decreased by less than 1%.

Improved road traffic emission inventories by adding mean speed distributions

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Volume 42, Issue 5, February 2008, Pages 916-926  
Abstract

Does consideration of average speed distributions on roads—as compared to single mean speed—lead to different results in emission modelling of large road networks? To address this question, a post-processing method is developed to predict mean speed distributions using available traffic data from a dynamic macroscopic traffic model (Indy) that was run for an actual test network (Amsterdam). Two emission models are compared: a continuous (COPERT IV) and a discrete model (VERSIT+macro). Computations show that total network emissions of CO, HC, NO<sub>x</sub>, PM<sub>10</sub> and CO<sub>2</sub> are generally (but not always) increased after application of the mean speed distribution method up to +9%, and even up to +24% at sub-network level (urban, rural, motorway). Conventional computation methods thus appear to produce biased results (underestimation). The magnitude and direction of the effect is a function of emission model (type), shape of the composite emission factor curve and change in the joint distribution of (sub)-network VKT (vehicle kilometres travelled) and speed. Differences

between the two emission models in predicted total network emissions are generally larger, which indicates that other issues (e.g., emission model validation, model choice) are more relevant.

TITLE: Impact of 30 km/h zone introduction on vehicle exhaust emissions in urban areas.

AUTHOR(S): PANIS-LI (VITO, BELGIUM); BROEKX-D (VITO, BELGIUM); BECKX-C (VITO, BELGIUM)

SOURCE: PROCEEDINGS OF THE EUROPEAN TRANSPORT CONFERENCE (ETC) 2006, SEPTEMBER 2006, STRASBOURG, FRANCE. 2006. 9p (9 Refs.)

PUBLISHER: LONDON ASSOCIATION FOR EUROPEAN TRANSPORT

PUBLICATION YEAR: 2006

LANGUAGE OF DOCUMENT: English

ABSTRACT: One of the most common traffic management schemes used in Belgium today is the conversion of entire districts, streets or street sections into 30 km/h zones. This is usually done in residential areas where the previous speed limit was 50 km/h. These measures, aimed at increasing traffic safety, are usually seen or even promoted as beneficial to the environment because of reduced fuel consumption and emissions. These claims however are unsubstantiated and stem from the believe that speed reduction measures in urban areas have similar benefits as those on highways. In contrast to this popular believe, wide spread emission estimation methods using quadratic functions such as the Copert/MEET approach would lead us to believe that emissions may rise dramatically. To shed some light on the problem we have calculated emissions for specific types of modern cars with the VeTESS-tool using real-life urban driving cycles. A comparison was then made with artificially modified driving cycles limiting the top speed to 30 km/h where appropriate and elongating the cycle to preserve the original cycle distance. Results indicate that emissions of most classic pollutants should not be expected to rise or fall dramatically. Nevertheless VeTESS results for range of typical modern cars indicate that some emissions such as PM exhaust from diesels may show a significant decrease. On the other hand the well-known MEET functions assume a moderate increase. Obviously the driving pattern differs significantly from that of a typical trip with an average speed of 30 km/h, making the use of MEET functions obsolete. In addition the effect on changes to the gear shifting strategy should be taken into account. To conclude we show that the exposure of residents to one of the most toxic components of the urban air pollution mixture is expected to decrease especially if the speed limit reduction is introduced as part of a balanced package of traffic measures.

<http://uhdspace.uhasselt.be/dspace/bitstream/1942/1366/1/impact%20of%2030.pdf>

TITLE: An Investigation on the Environmental Benefits of a Variable Speed Control Strategy.

AUTHOR(S): Wang-Zhong; Walton-CMichael

CORPORATE AUTHOR(S): University of Texas, Austin, Center for Transportation Research, 3208 Red River, Suite 200, Austin, TX, 78705-2650, USA; Southwest Region University Transportation Center, Texas Transportation Institute, Texas A&M University, College Station, TX, 77843-3135, USA

SOURCE: 2006/09. September 2004 - August 2005 58p (1 Phot., 8 Fig., 1 Tab., Refs., 2 App.)

SOURCE NOTES: This research was funded by the U.S. Department of Transportation, University Transportation Centers Program.

PUBLICATION YEAR: 2006

REPORT NUMBER(S): Report Number: SWUTC/06/473700-00072-1; Report Number: Report 473700-00072-1; Contract/Grant Number: DTRS99-G-0006 (Grant)

LANGUAGE OF DOCUMENT: English

ABSTRACT: The safety benefits of variable speed limits (VSL) have already been widely recognized. However, the environmental benefits of variable speed limits have been largely ignored. This paper presents a study of the potential benefits of variable speed limits in reducing mobile emissions. A Monte Carlo simulation approach is developed to evaluate the effectiveness of the idea of using variable speed limits to manage and reduce mobile emissions. A case study is performed on the IH-35 corridor in Austin, Texas. The numerical results indicate that on "Ozone Action" days, by managing the freeway/expressway traffic speeds at appropriate levels through VSL, the major pollutants, such as Nitrogen Oxides (NOx) emissions, could be significantly reduced. Considering the large contribution from freeway/expressway traffic to mobile emissions, a variable speed limit strategy could be an effective measure to balance travelers' need for mobility with conservation of the environment.

<http://swutc.tamu.edu/publications/technicalreports/473700-00072-1.pdf>

TITLE: Assessing the benefits of options to improve the UK's air quality.

AUTHOR(S): THOMAS-R

SOURCE: LOCAL TRANSPORT TODAY. 2006/04/20. (441) pp10-1

PUBLISHER: LOCAL TRANSPORT TODAY LTD, QUADRANT HOUSE, 250 KENNINGTON LANE, LONDON, SE11 5RD, UNITED KINGDOM

PUBLICATION YEAR: 2006

ISSN: 0962-6220

LANGUAGE OF DOCUMENT: English

ABSTRACT: In 2006, the UK Government published a consultation on proposals to amend the air quality strategy (AQS). Transport-related measures included tighter European vehicle emissions standards, incentives for the early

uptake of new Euro-standards and low emission vehicles, and a national road pricing scheme. For the first time it includes monetary values for health benefits associated with improved air quality. It also recommended that the objective of reducing particulate levels at key hotspots be abandoned. The main focus of the strategy was on reducing particulate emissions. The consultation was pessimistic about the likely effectiveness of low emission zones (LEZ) in improving air quality in a cost effective manner. The consultation also considered the role of local authorities in improving air quality, e.g. by reducing speed limits.

Getting the genie back in the bottle: limiting speed to reduce carbon emissions and accelerate the shift to low carbon vehicles

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In the discussion relating to the myriad of carbon abatement solutions from the transport sector, surprisingly little attention is paid to speed enforcement and reduction. Speed limits are rarely regarded as an innovative instrument to achieve

carbon reductions or to alter the context for the supply and demand of low carbon vehicles. Where the carbon reducing potential is acknowledged, limiting speed is generally dismissed as not politically viable.

This paper will demonstrate that a lower, or even merely better enforced, top speed limit should not be ignored as it is one of the most certain, equitable, cost effective and potentially popular routes to a lower carbon economy.

[http://www.lowcvp.org.uk/assets/other/lowcvp\\_challenge\\_booklet.pdf#page=30](http://www.lowcvp.org.uk/assets/other/lowcvp_challenge_booklet.pdf#page=30)

THE EFFECTS OF SPEED MEASURES ON AIR POLLUTION AND TRAFFIC SAFETY

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As known the external effects play an important role in discussions about the societal effects of traffic and transport developments and measures. Major external effects are traffic safety, air quality and climate effects. In assessing measures mostly the benefits are calculated as accessibility gains and the losses are calculated as external effects. Travel speed seems the connecting factor concerning the effects of accessibility, safety, air quality and climate. High speeds, large speed differences between vehicles, and speed variation (accelerating, braking) have a negative effect on each of the first mentioned factors. At the same time, high speeds do result in short journey times, but motorists generally overestimate the amount of time saved (ETSC, 1995). In addition, high speeds result in more crashes and crashes are an important cause of congestion, especially on through roads (Knibbe, 2005). If travel speed can be managed on the right way it should be possible to optimize traffic streams, but what are the theoretical relations between travel speed and the external effects? This paper focuses on travel speed as a major 'cause' of external losses. We start with a short introduction of what is found in the literature. So we give a short overview of the relations based on earlier research done by several parties. Next we show results of recently undertaken measures in the Netherlands as in this country a lot of speed measures can be found. Also we discuss the possibilities of assessing the effects using models. Finally we will come up with conclusions.

[http://www.goudappel.nl/Site/basicsite.nsf/0/1FB37C466248B8D7C12573D1005723DA/\\$file/The%20effects%20of%20speed%20measures%20on%20air%20pollution%20and%20traffic%20safety.pdf](http://www.goudappel.nl/Site/basicsite.nsf/0/1FB37C466248B8D7C12573D1005723DA/$file/The%20effects%20of%20speed%20measures%20on%20air%20pollution%20and%20traffic%20safety.pdf)

TITLE: Reducing speed limits on highways: Dutch experiences and impact on air pollution, noise-level, traffic safety and traffic flow.

AUTHOR(S): OLDE-MJT (GOUDAPPEL COFFENG BV, NETHERLANDS); VAN-BEEK-P (GOUDAPPEL COFFENG BV, NETHERLANDS); STEMERDING-MP (GOUDAPPEL COFFENG BV, NETHERLANDS); HAVERMANS-PF (MINISTRY OF TRAFFIC AND TRANSPORT . THE NETHERLANDS)

SOURCE: PROCEEDINGS OF ETC 2005, STRASBOURG, FRANCE  
18-20 SEPTEMBER 2005 - TRANSPORT POLICY AND OPERATIONS -

PLANNING FOR SUSTAINABLE LAND USE AND TRANSPORT - MANAGING MOBILITY. 2005. 11p (7 Refs.)

PUBLISHER: LONDON ASSOCIATION FOR EUROPEAN TRANSPORT

PUBLICATION YEAR: 2005

LANGUAGE OF DOCUMENT: English

ABSTRACT: One of the measures to decrease the concentration of NO<sub>2</sub> near freeways is to reduce the maximum speed from 120 or 100 km/h to 80 km/h. The effect is reasonably well-known in the Netherlands because of the introduction of this measure near Overschie (A13 Rotterdam) in 2002, accompanied by strict enforcement. Given the positive results near Overschie, the question arose as to whether the 80 km/h speed limit would also lead to an improvement of air quality, noise-level, traffic flow and traffic safety at these bottlenecks. To answer this question, a detailed study was conducted to determine the effects of an 80 km/h speed limit with route control on air quality, noise-level, traffic safety and traffic flow. The effect of the speed reduction was determined for three years: the current situation (2002) and two future years (2010 and 2015). The year 2010 is relevant for the Air Quality Order and 2015 is important because of the introduction of Euro IV and V. To determine the effects for air quality, noise-level and traffic flow, we used highly detailed 'state of the art' models. The results showed that an improvement of air quality near freeways of up to 5% is possible by decreasing speed from 100 to 80 km/h (for two locations the speed decreases from 120 to 80 km/h). However, the effect varies by location. The maximum effects were found around the large cities Amsterdam, Rotterdam and Utrecht. The average improvement for NO<sub>2</sub> was about 5%. The effect of the measure on emissions was much larger than on concentrations. The effects for PM<sub>10</sub> concentrations were generally small, mainly because of the smaller contribution of local traffic to total concentrations. The effect is clearly larger for NO<sub>2</sub> than PM<sub>10</sub>. The absolute effects in 2010 and 2015 were comparable with those for 2002, although the relative effect was even larger. The introduction of a speed limit with route control had, in general, a positive effect on noise levels. The average effect varied between 0,2 dB(A) and 1,3 dB(A). In 2010 and 2015, the effect was similar to the current situation. The safety-effects near Overschie were very positive: the number of accidents and victims decreased substantially (around 60 and 90%, respectively). The positive effects were caused by lower speeds and more homogeneous traffic flows because of route control. The effects for the other locations were estimated with knowledge based on empirical studies. On average, the total number of accidents decreased by 35% and the total number of injury accidents by 47%. In 2010 and 2015, the expected effects were less because of increasing intensity and congestion. An 80 km/h speed limit led to a decrease in the average speed of traffic. The largest decreases were observed in free flow situations. For almost every location, the variation in journey time decreased. Again, the largest decreases were at free flow. Network effects were minimal. The future effects were the same for most of the locations.

Comparative field evaluation of vehicle cruise speed and acceleration level impacts on hot stabilized emissions

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Transportation Research Part D: Transport and Environment  
Volume 10, Issue 1, January 2005, Pages 13-30  
Abstract

The main objectives of this paper are two fold. First, the paper evaluates the impact of vehicle cruise speed and acceleration levels on vehicle fuel-consumption and emission rates using field data gathered under real-world driving conditions. Second, it validates the VT-Micro model for the modeling of real-world conditions. Specifically, an on-board emission-measurement device was used to collect emissions of oxides of nitrogen, hydrocarbons, carbon monoxide, and carbon dioxide using a light-duty test vehicle. The analysis demonstrates that vehicle fuel-consumption and emission rates per-unit distance are optimum in the range of 60–90 km/h, with considerable increase outside this optimum range. The study demonstrates that as the level of aggressiveness for acceleration maneuvers increases, the fuel-consumption and emission rates per maneuver decrease because the vehicle spends less time accelerating. However, when emissions are gathered over a sufficiently long fixed distance, fuel-consumption and mobile-source emission rates per-unit distance increase as the level of acceleration increases because of the history effects that accompany rich-mode engine operations. In addition, the paper demonstrates the validity of the VT-Micro framework for modeling steady-state vehicle fuel-consumption and emission behavior. Finally, the research demonstrates that the VT-Micro framework requires further refinement to capture non-steady-state history behavior when the engine operates in rich mode.

Title POTENTIAL BENEFITS AND COSTS OF SPEED CHANGES ON RURAL ROADS

Accession No 00967070

Authors CAMERON, M

Journal Title Publication of: Monash University, Australia information Corp. Authors

/ Publisher Monash University, Australia information; Australian Transport Safety Bureau information

Publication Date 20031000

Description 138 p.; Figures; References

Languages English

Abstract The objective of the project was to explore the potential economic costs and benefits of changes to speed limits on rural roads in Australia. Net costs and benefits were estimated over a range of mean travel speeds (80 to 130 km/h) for rural freeways, other divided roads and undivided roads. Within the

limits of the assumptions made and the data available for this study, the following general conclusions were reached: 1. Increasing the speed limit to 130 km/h for all vehicles on rural freeways would have substantial social costs. The total social cost could be constrained, and even reduced, if trucks were limited to 100 km/h on such roads. A variable speed limit system allowing speeds of 120 km/h for cars and light commercial vehicles during good conditions, but reduced to 100 km/h under adverse conditions, while limiting trucks to 100 km/h at all times, would keep total social costs below current levels. However, all scenarios whereby speed limits are increased for some vehicle types and circumstances are necessarily accompanied by increased road trauma to provide travel time saving benefits. 2. Increasing the speed limit to 130 km/h on rural divided roads would have even greater social costs than the increased limit on freeways. If trucks were limited to 100 km/h, the impact on total social costs would be smaller but they would still increase. Even a variable speed limit like that for freeways described above would be associated with an increase in road trauma costs. The higher crash rate on the divided roads compared with rural freeways will result in any speed limit increase producing even greater road trauma increases than on the freeways, despite lower traffic volumes on non-freeway roads. 3. If the 'willingness to pay' valuations of crash costs reflecting consumer preferences are used, the optimum speeds on rural freeways would be 120 km/h for cars and light commercial vehicles and 95 km/h for trucks. On divided rural roads, the optimum speeds would be 110 km/h and 90 km/h, respectively. If the speed limits on each of these rural roads were to be set at these optimum speeds for each vehicle type, there would be a reduction in total social costs in each environment. However, there would be increases in road trauma on the rural freeways due to the increase in car speeds. 4. There is no economic justification for increasing the speed limit on two-lane undivided rural roads, even on those safer roads with sealed shoulders. On undivided roads through terrain requiring slowing for sharp bends and occasional stops in towns, the increased fuel consumption and air pollution emissions associated with deceleration from and acceleration to high cruise speeds would add very substantially to the total social costs. Using 'human capital' costs to value road trauma, the optimum speed for cars is about the current speed limit (100 km/h) on straight sections of these roads, but 10-15 km/h less on the curvy roads with intersections and towns. The optimum speed for trucks is substantially below the current speed limit, and even lower on the curvy roads.

[http://www.atsb.gov.au/publications/2003/pdf/Rural\\_Speed\\_2.pdf](http://www.atsb.gov.au/publications/2003/pdf/Rural_Speed_2.pdf)

Reducing CO2 emissions in the transport sector

A status report by the Federal Environmental Agency - A description of measures and update of potentials

September 2003

5.3 Speed limits: <http://www.umweltdaten.de/publikationen/fpdf-l/2607.pdf#page=53>

**TITLE:** Emissions at different conditions of traffic flow.  
**AUTHOR(S):** SUCHAROV-LJ(ED) (Wessex Inst Technol, UK); BREBBIA-CA(ED) (Wessex Inst Technol, UK); BENITEZ-F(ED) (Seville Univ, Spain); VEURMAN-J (Min of Transp, Netherlands); GENSE-NLJ (TNO Automotive, Netherlands); WILMINK-IR (TNO Inro, Netherlands); BAARBE-HI (Min of Public Housing, Spatial Planning & the Environment, Netherlands)  
**SOURCE:** URBAN TRANSPORT VIII - URBAN TRANSPORT AND THE ENVIRONMENT IN THE 21ST CENTURY. 2002. 39 pp571-80 (3 Refs.)  
**PUBLISHER:** WIT PRESS, ASHURST LODGE, ASHURST, SOUTHAMPTON, SO40 7AA, UNITED KINGDOM  
**PUBLICATION YEAR:** 2002  
**ISSN:** 1462-608X  
**REPORT NUMBER(S):** 1-85312-905-4  
**LANGUAGE OF DOCUMENT:** English

**ABSTRACT:** Although it is widely assumed that congestion causes an increase in exhaust gas emissions, it has always been difficult to quantify this relationship. The project Emissions and Congestion investigated this relationship by simultaneously measuring traffic conditions and emissions. Emission factors were derived for different traffic conditions on motorways, ranging from free flow to heavy congestion. The results clearly indicate that there are significant differences in emissions and fuel consumption for different types of traffic flow. Heavy traffic dynamics, shortcut traffic, heavy congestion and high speeds lead to significant increases of regulated emissions and fuel consumption of motorway traffic. Efforts to reduce congestion and traffic dynamics (by traffic management measures) should be concentrated on specific routes or sections with frequent occurrence of heavy congestion and a large share of heavy duty traffic. These are the motorways in the conurbations. Tens of percents of reduction in emissions are possible. The resulting improvements on local air quality can be significant. Lowering the speed limit to 100 km/h on all sections of Dutch motorways can significantly improve emission levels (most of Dutch motorways have a speed limit of 120 km/h).

**TITLE:** Driving pattern, exhaust emission and fuel consumption over a street network.  
**AUTHOR(S):** STURM-P(ED); MINARIK-S(ED); ERICSSON-E (Lund Univ, Sweden)  
**SOURCE:** PROCEEDINGS OF 11TH INTERNATIONAL SYMPOSIUM, TRANSPORT AND AIR POLLUTION, HELD GRAZ UNIVERSITY OF TECHNOLOGY, AUSTRIA, 19-21 JULY 2002, VOLUME I. 2002. pp331-40 (15 Refs.)  
**PUBLISHER:** GRAZ UNIVERSITY OF TECHNOLOGY, INFFELDGASSE 25, GRAZ, A-8010, AUSTRIA

PUBLICATION YEAR: 2002  
REPORT NUMBER(S): 3-901351-59-0  
LANGUAGE OF DOCUMENT: English

**ABSTRACT:** The driving patterns, i.e. the speed and acceleration profiles, of vehicles are known to affect the exhaust emission and fuel consumption to a large extent. In this investigation driving pattern was studied for a whole street network in an observational study. Data were collected using five measuring cars that were driven by 29 randomly chosen families for two weeks each. The cars were equipped with data-logging devices that enabled studies of the speed and acceleration patterns of the vehicles as well as engine speed and gear changing behaviour. For connection to external conditions, co-ordinates for position were registered using global positioning system (GPS) receivers. The GPS co-ordinates were matched to a digitised map to which detailed street information had been attributed. A descriptive analysis of driving patterns on 21 street types, formed by different street functions, types of area, speed limit and number of lanes, was accomplished including altogether more than 14000 driving patterns. For a subset of about 4000 driving patterns the exhaust emission factors (g/km) and fuel consumption factor (litres/10 km) were calculated for 10 street types. By aggregating driving patterns and modelled emissions over street types, it was possible to describe a large set of driving pattern parameters including speed, acceleration, power use and engine speed as well as hot, stabilised fuel consumption factors and exhaust emission factors for different street and traffic environments. On top of the emission per vehicle km, the total emission in different types of streets is of importance. To explore this, the emission factors for each street type were multiplied by the total vehicle mileage for that particular type of street. The paper serves as an illustration of the fact that driving pattern and emission factors vary over the street network. It can be concluded that traffic environments which produce high emissions per vehicle km is not always similar to those who cause the overall highest amount of emissions and fuel consumption.

**TITLE:** Sustainability assessment of speed regulation of urban traffic.  
**AUTHOR(S):** MAO-B (Northern Jiaotong Univ, China); CHEN-H (Leeds Univ, Inst Transp Studies, UK); CHEN-S (Northern Jiaotong Univ, China)  
**SOURCE:** IATSS RESEARCH. 2002. 26(2) pp18-24 (22 Refs.)  
**PUBLISHER:** INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES, 6-20, 2-CHOME, YAESU, CHUO-KU, TOKYO 104-0028, JAPAN  
**PUBLICATION YEAR:** 2002  
**ISSN:** 0386-1112  
**LANGUAGE OF DOCUMENT:** ENGLISH

**ABSTRACT:** Speed regulation of motor vehicles has widely affected the living environment and standard of residents in urban areas. It is believed that lower speed of motor vehicles could decrease the traffic accident rate on roads. However, lower speeds may cause many problems indirectly to social

development and the health of residents. The average speed of motor vehicles in urban areas in China may be among the lowest in the world due to its mixed traffic environment and vehicle properties. In most central areas of large Chinese cities, the average speed of motor vehicles has been lower than 25km/h. However, this does not mean a safer system for transportation. For example, the death toll of transportation systems in China has exceeded 70,000 every year and is among the highest in the world. This paper analyses the general situation of various speed regulations on motor vehicles in China. A brief review on the relationship between speed and safety on urban transport has been described. Authors believe that the most important factor to menace transport safety is the coordination of motor vehicles with bicycles and pedestrians especially in urban areas. A quantitative assessment on indirect effects of speed regulation has then been discussed. The assessment covers four aspects. Firstly, it estimates the additional emissions resulted from speed regulation. Secondly, it calculates the contribution to road traffic density of extra stay of vehicles caused by speed change. Thirdly, it analyses the change of passenger journey time caused by speed regulation in urban areas. Finally, the paper calculates the energy consumption of vehicles related to speed regulation. The paper also discusses the policy on speed regulation from viewpoint of sustainable development of urban society. It concludes that higher speed of motor vehicles is of better sustainability in the current situation of Chinese urban areas. Some suggestions on speed regulation for different situations in China have also been presented. The research has been part of the project funded by the Natural Science Foundation of China (No. 70173014) and the Royal Society of UK.  
<http://www.iatss.or.jp/english/research/26-2/pdf/26-2-02.pdf>

TITLE: TTI ASSISTS IN NATION'S FIRST STATEWIDE AIR QUALITY CAMPAIGN.

SOURCE: Texas Transportation Researcher. 2002. 38(2) pp20 (1 Phot., 1 Fig.)

PUBLISHER: Texas Transportation Institute, Texas A&M University, College Station, TX, 77843-3135, USA

PUBLICATION YEAR: 2002

ISSN: 0040-4748

LANGUAGE OF DOCUMENT: English

ABSTRACT: "Drive Clean Across Texas" is the first statewide public outreach and education campaign to promote five steps that drivers can take to reduce moving-source tailpipe emissions. Vehicle maintenance, reduction in driving, using cleaner-burning vehicles, obeying the speed limit and turning engines off instead of idling are the main areas being focused on. A Web site <[www.drivecleanacrosstexas.org](http://www.drivecleanacrosstexas.org)>, brochures, bumper stickers, billboards and a speaker's kit are among the elements. There are also radio and TV ads. Receiving special attention are four metropolitan areas that are not in attainment with federal clean air requirements.

TITLE: The relationship between fuel economy and safety outcomes.  
AUTHOR(S): HAWORTH-N (Monash Univ, Australia); SYMMONS-M (Monash Univ, Australia)  
SOURCE: Report. 2001/12. (188) 57P  
PUBLISHER: MONASH UNIVERSITY. ACCIDENT RESEARCH CENTRE (MUARC), WELLINGTON ROAD, CLAYTON, VICTORIA, 3800, AUSTRALIA

PUBLICATION YEAR: 2001  
REPORT NUMBER(S): 0-7326-1487-2  
LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: This report examines the possible safety benefits from driving in a manner that results in lower fuel consumption and emissions. It attempts to assess the potential of promoting additional motivations to drive safely -better fuel economy and other environmental outcomes, and reduced running costs. Reducing speeding, lower speed limits and modifying driving style were found to improve fuel economy and other environmental outcomes in addition to improving safety. Programs such as these that result in reduced fuel consumption in addition to safety are more likely to be implemented because the benefits (in terms of fuel cost savings) flow directly to the vehicle owner. The case study found that the fuel consumption rate of crash-involved vehicles was higher than that of vehicles not involved in crashes and demonstrated the feasibility of this method. Comparisons before and after training in driving to reduce fuel consumption and analytical studies based on fleet data are recommended as measures of the safety effects of fuel-efficient driving.  
[http://www.infrastructure.gov.au/roads/safety/publications/2001/pdf/fuel\\_economy.pdf](http://www.infrastructure.gov.au/roads/safety/publications/2001/pdf/fuel_economy.pdf)

TITLE: Driving to reduce fuel consumption and improve road safety.  
AUTHOR(S): HAWORTH-N (Monash University. Accident Research Centre (MUARC)); SYMMONS-M (Monash University. Accident Research Centre (MUARC))  
SOURCE: ROAD SAFETY RESEARCH, POLICING AND EDUCATION CONFERENCE, 2001, MELBOURNE, VICTORIA, AUSTRALIA. 2001. 7P  
PUBLISHER: MONASH UNIVERSITY. CONFERENCE MANAGEMENT OFFICE, MONASH UNIVERSITY, CLAYTON, VICTORIA, 3800, AUSTRALIA

PUBLICATION YEAR: 2001  
REPORT NUMBER(S): 0-7326-2190-9  
LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: As part of an ongoing project, this paper examines the possible safety benefits of driving in a manner that results in lower fuel consumption and emissions. Generally, a reduction in driving speed and a

smoother driving style would be expected to decrease crash risk and improve fuel economy. However, a review of the literature indicated that the relationship between speed and fuel consumption or emissions is quite complex. Furthermore, some methods of encouraging a reduction in speed, such as local area traffic management, may actually increase fuel consumption. The paper reviews the effects of various driver training programs (particularly in Europe) that aim to reduce fuel consumption. The environmental benefits coupled with reduced running costs of an altered driving style may be an attractive message to some segments of the community. Such changes are also likely to be a more popular choice than measures that attempt to reduce vehicle travel, at least in the short term.

[http://www.monash.edu.au/cemo/roadsafety/abstracts\\_and\\_papers/096/HawSym2.pdf](http://www.monash.edu.au/cemo/roadsafety/abstracts_and_papers/096/HawSym2.pdf)

TITLE: Lower urban speed limits: trading off safety, mobility and environmental impact.

AUTHOR(S): TAYLOR-MAP (South Australia Univ); DYSON-CB (South Australia Univ); WOOLLEY-JE (South Australia Univ); ZITO-R (South Australia Univ)

SOURCE: AUSTRALASIAN TRANSPORT RESEARCH FORUM (ATRF), 24TH, 2001, HOBART, TASMANIA, AUSTRALIA. 2001. 18P

PUBLISHER: TASMANIA. DEPARTMENT OF INFRASTRUCTURE, ENERGY AND RESOURCES, GPO BOX 936, HOBART, TASMANIA, 7001, AUSTRALIA

PUBLICATION YEAR: 2001

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: Lower urban speed limits (LUSL) are being applied to residential areas in many jurisdictions in Australia including parts of Adelaide, South East Queensland, areas of New South Wales and, more recently, Victoria. LUSL are seen as having significant road safety advantages - if they can be made to work - through traffic calming outcomes and therefore could greatly contribute to 'vision zero'? This paper presents evidence quantifying the impacts of LUSL in terms of measured speeds and volumes, community attitudes, fuel and environmental impacts, travel times and road safety outcomes based on published and emerging evidence. Much of the evidence is based on research into the city wide Unley 40km/h scheme in Adelaide and the computer simulation modelling of the mobility and environmental effects of LUSL as comparisons with safety benefits. It indicates that LUSL can achieve sustainable speed reductions, although the results for traffic performance and environmental impact are more complicated. Under different conditions emissions may be reduced or increased by the use of LUSL.

TITLE: Network modelling of the traffic, environmental and energy effects of lower urban speed limits.

AUTHOR(S): TAYLOR-MAP (South Australia Univ)

SOURCE: ROAD AND TRANSPORT RESEARCH. 2000/12. 9(4) pp48-57 (9 Refs.)

PUBLISHER: ARRB TRANSPORT RESEARCH LTD, VERMONT SOUTH, VICTORIA, AUSTRALIA

PUBLICATION YEAR: 2000

ISSN: 1037-5783

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: Recent studies have indicated that lower urban speed limits offer significant road safety benefits. An issue which has arisen in assessing the importance of these benefits is the likely impact of lower speed limits on other aspects of road travel, such as mobility and travel time, fuel consumption and emissions. This paper examines preliminary indications of the possible effects of reduced speed limits on these factors, using the TrafikPlan traffic network analysis model. It considers the effects of lower speed limits and speed zoning, as applied to a range of urban road and street types, on journey times, mobility and accessibility, and fuel consumption and emissions in urban and suburban areas. The paper outlines the results found for a synthetic grid network to which two different traffic design standards were applied. The network was modelled at four different levels of traffic congestion, ranging from light to moderate traffic, to oversaturated conditions. For each combination of network and traffic congestion level, three speed limit regimes (60, 50 and 40 km/h) were applied and modelled using TrafikPlan. The study concludes that: (1) journey speeds in the test networks were considerably less than the set speed limits; (2) differences in overall travel speeds and journey times were much less than the differences in the speed limits themselves; (3) signal coordination offered significant advantages for delays and traffic progression, except at higher congestion levels where some oversaturation was experienced; and (4) an argument for public acceptance of lower speed limits could be based on an improvement in traffic progression and quality of traffic flow possible under the lower speed limit regimes.

Uncertainties of modelling emissions from road transport

J. Kühlwein Corresponding Author Contact Information, E-mail The  
Corresponding Author and R. Friedrich  
Atmospheric Environment  
Volume 34, Issue 27, 2000, Pages 4603-4610  
Abstract

To determine emission data from road transport, complex methods and models are applied. Emission data are characterized by a huge variety of source types as well as a high resolution of the spatial allocation and temporal variation. So

far, the uncertainties of such calculated emission data have been largely unknown. As emission data is used to aid policy decisions, the accuracy of the data should be known. So, in the following, the determination of uncertainties of emission data is described. Using the IER emission model for generating regional or national emission data, the uncertainties of model input data and the total errors on different aggregation levels are exemplarily investigated for the pollutants NO<sub>x</sub> and NMHC in 1994 for the area of West Germany. The results of statistical error analysis carried out for annual emissions on road sections show variation coefficients (68.3% confidence interval) of 15–25%. In addition, systematic errors of common input data sets have been identified especially affecting emissions on motorway sections. The statistical errors of urban emissions with warm engine on town level amount to 35%. Therefore they are considerably higher than the errors outside towns. Error ranges of additional cold start emissions determined so far have been found in the same order. Additional uncertainties of temporally highly resolved (hourly) emission data depend strongly on the daytime, the weekday and the road category. Variation coefficients have been determined in the range between 10 and 70% for light-duty vehicles and between 15 and 100% for heavy-duty vehicles. All total errors determined here have to be regarded as lower limits of the real total errors.

#### Driving speeds in Europe for pollutant emissions estimation

M. André Corresponding Author Contact Information, E-mail The Corresponding Author, a and U. Hammarström

#### Abstract

The sensitivity of the pollutant emissions as regards the driving speed is demonstrated using emission functions currently available from the literature. An accurate and detailed knowledge of the actual driving speeds is then fundamental for emissions estimations and inventories. However, speed information is often limited and heterogeneous. Through a European synthesis, we examine the various means of investigations: surveys, vehicle instrumentation, traffic modelling, etc.

The available statistics provide a high number of reference values for passenger cars and duty vehicles by broad categories and highlight the influence of numerous factors on speed: time period, city size and area, trips origin and destination and vehicle types. Speed estimations and ranges are proposed for the driving in urban areas, on rural roads and on motorways.

The significant variations of the speed according to the time of the day, to the areas of a city, and the large dispersion for a given situation raise the question of

using single average values. In fact, emissions estimation can be affected by 30% by the quality of the driving speed data.

TITLE: THE EFFECTS OF RAISING SPEED LIMITS ON MOTOR VEHICLE EMISSIONS.

CORPORATE AUTHOR(S): EH Pechan and Associates, Incorporated, 5537-C Hempstead Way, Springfield, VA, 22151-, USA

SOURCE: 1997/03. pp49 (Tabs., Refs.)

PUBLICATION YEAR: 1997

LANGUAGE OF DOCUMENT: English

ABSTRACT: In 1974 the Federal government introduced a national speed limit of 55 miles per hour (mph) in response to the Arab oil embargo and subsequent energy crisis. This limit was raised to 65 mph for rural interstate freeways in 1987. In November of 1995, as part of the National Highway System Bill (H.R. 2274, 1995), these limitations were eliminated and control of maximum highway speeds was relinquished to the States. This analysis investigates the impact on air quality that is expected to occur as a result of the elimination of Federal speed limits. This was done by determining where speed limits have changed in the past year (by State and roadway type) and modeling expected resulting speed changes using the U.S. Environmental Protection agency's (EPA's) MOBILE5a highway vehicle emission factor model.

<http://www.epa.gov/OMSWWW/inventory/spd2-rpt.pdf>

TITLE: EMISSIONS IMPACT OF ELIMINATING NATIONAL SPEED LIMITS: ONE YEAR LATER.

AUTHOR(S): Mullen-MA; Wilson-JH Jr.; Gottsman-L; Noland-RB; Schroeer-WL

SOURCE: Transportation Research Record. 1997. (1587) pp113-120 (1 Fig., 5 Tab., 4 Ref.)

SOURCE NOTES: This paper appears in Transportation Research Record No. 1587, Effects of Transportation on Energy and Air Quality.

PUBLISHER: Transportation Research Board, 2101 Constitution Avenue, NW, Washington, DC, 20418, USA

PUBLICATION YEAR: 1997

ISSN: 0361-1981

REPORT NUMBER(S): 0309061695

LANGUAGE OF DOCUMENT: English

ABSTRACT: The National Highway System (NHS) bill passed by Congress in November 1995 eliminated the national maximum speed limit. It has allowed states to set their own speed limits, which many have changed during the past year. This analysis examines the impact of speed limit changes 1 year after passage of the NHS. Oxides of nitrogen (NOx), carbon monoxide, and

volatile organic compounds are analyzed and are found to have increased nationwide by up to 6%, 7%, and 2%, respectively. Much of the increase has occurred in western states, which generally have increased vehicle speeds more than in eastern and midwestern states. For example, in Texas NOx emissions are estimated to have increased by 35% due to large increases in highway and arterial speed limits.

<http://trb.metapress.com/content/47p4001237k6515j/fulltext.pdf>

(note: this url will work only from a computer on the WSDOT network)

Emissions Impact of Elimination of the National 55 mph Speed Limit

01.08.96

[http://www.arb.ca.gov/cc/scopingplan/submittals/transportation/emissions\\_impact\\_of\\_elimination\\_of\\_the\\_national\\_55\\_mph\\_speed\\_limit.pdf](http://www.arb.ca.gov/cc/scopingplan/submittals/transportation/emissions_impact_of_elimination_of_the_national_55_mph_speed_limit.pdf)

TITLE: RESULTS OF THE SCIENTIFIC INVESTIGATION  
ACCOMPANYING THE PILOT TRIAL OF 30 KPH LIMIT IN SIDE STREETS  
AND 50 KPH LIMIT IN PRIORITY STREETS.

AUTHOR(S): WERNSPERGER-F (INST HIGHWAY ENG &  
TRANSP, GRAZ TECH UNIV, AUSTRIA); SAMMER-G (INST HIGHWAY ENG &  
TRANSP, GRAZ TECH UNIV, AUSTRIA)

SOURCE: TRAFFIC MANAGEMENT AND ROAD SAFETY.  
PROCEEDINGS OF SEMINAR G HELD AT THE 23RD PTRC EUROPEAN  
TRANSPORT FORUM, UNIVERSITY OF WARWICK, SEPTEMBER 11-15 1995.  
VOLUME P394. 1995. pp27-38 (4 Refs.)

PUBLISHER: PTRC EDUCATION AND RESEARCH SERVICES  
LTD, GLENTHORNE HOUSE, HAMMERSMITH GROVE, LONDON, W6 0LG,  
UNITED KINGDOM

PUBLICATION YEAR: 1995

ISSN: 0952-3103

REPORT NUMBER(S): 0-86050-284-8

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: Following the success of pilot 30kph limit zones in the city of Graz, Austria, a city-wide 30kph scheme was adopted with the exception of 50kph 'priority' roads. This paper describes a study of the traffic situation before and after the implementation of the scheme. Aspects considered include a) road accidents, b) average speed, c) driver behaviour, d) changes to mode of transport, e) exhaust emissions and fuel consumption, f) traffic noise and g) public attitudes to the scheme. The speed limit was found to improve safety, reduce noise pollution but make little difference to emissions.

Driving patterns and emissions from different types of roads

Steen Solvang Jensen  
Science of The Total Environment  
Volume 169, Issues 1-3, 8 July 1995, Pages 123-128  
Abstract

The project evaluates the relationship between emissions and travel speeds on different types of roads such as city streets, highways, express roads and motorways. Approximately 800 measured driving patterns of 13 streets and roads have been analysed and emissions have been predicted in an emission model, also taking into account deterioration factors and cold start emissions. The result of the analysis is a clear relationship between travel speed (trip length divided by trip time) in the range of 10–120 km/h and emissions from all vehicle types. For petrol-powered passenger cars catalysts reduce HC, CO and NOx emissions by 70–80% on main roads and by 60–75% on city streets. The difference is due to the proportion of cold engines in city traffic. In city streets, when cars with cold engines are included, the emissions of CO and HC from petrol-powered passenger cars are found to be 10–20% and 5–10% higher, respectively. Travel speed -and not the type of road—is crucial to the level of emissions. However, express roads have slightly higher emission levels than motorways at similar travel speeds, presumably because traffic flows are less steady on express roads than on motorways.

TITLE: GENERAL 30 KPH SPEED LIMIT IN THE CITY: THE RESULTS OF A MODEL PROJECT IN THE CITY OF GRAZ.

AUTHOR(S): SAMMER-G (GRAZ UNIVERSITY OF TECHNOLOGY, AUSTRIA)

SOURCE: PROCEEDINGS OF THE THIRD INTERNATIONAL CONFERENCE ON SAFETY AND THE ENVIRONMENT IN THE 21ST CENTURY: LESSONS FROM THE PAST, SHAPING THE FUTURE, NOVEMBER 7-10, 1994, TEL AVIV, ISRAEL. 1994. pp598-608 (6 Refs.)

PUBLISHER: TRANSPORTATION RESEARCH INSTITUTE, TECHNION-ISRAEL INSTITUTE, TECHNION CITY, HAIFA, 32000, ISRAEL

PUBLICATION YEAR: 1994

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: This paper describes a general 30 km/h speed limit introduction project in the Austrian city of Graz on 1 September 1992, except for priority roads. The regulation is seen as a two-year trial. The priority roads have a 50km/h limit in general. The Graz 30 km/h speed limit model consisted of: (1) traffic regulation; (2) public relations and the public awareness formation; and (3) police supervision. The general 30 km/h speed limit introduction is a part of an integrated transport plan. Important results of the before and after study into the 30 km/h speed limit introduction effects are: (a) The acceptance of the measure by all road users has risen greatly after the introduction; (b) There has been a significant reduction in the number of both accidents (12%) and of seriously

injured persons (about 20%) referring to the whole road network; (c) The maximum speeds have gone down greatly on both the 30 km/h speed limit roads and on the priority roads; (d) Road users show more consideration to one another on 30 km/h speed limit roads; (e) A reduction of the noise level up to 2.5 dB on 30 km/h speed limit roads was shown in the after study; and (f) the nitrogen oxide (NOx) emissions on the 30 km/h speed limit road network reduced by a quarter.

TITLE: SPEED: A HUMAN AND PLANETARY HEALTH HAZARD  
AUTHOR(S): DAVIS-A (FRIENDS OF THE EARTH)  
SOURCE: PROCEEDINGS OF THE 59TH ROSPA NATIONAL ROAD SAFETY CONGRESS 14-16 MARCH 1994. SPEED A LIMITED FUTURE?. 1994. 19P

PUBLISHER: ROYAL SOCIETY FOR THE PREVENTION OF ACCIDENTS (ROSPA), CANNON HOUSE, PRIORY QUEENSWAY, BIRMINGHAM, B4 6BS, UNITED KINGDOM

PUBLICATION YEAR: 1994

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: This paper attempts to illustrate how addiction to speed has had a widespread influence on transport and society. It is not only an issue related to reducing fatalities and injuries from road accidents, vital as that is. It has many other harmful effects. Perceptions of the dangers of motor vehicles have adversely affected independent mobility of children and other vulnerable road users, and reduced the extent to which they cycle and walk. There is growing concern that current speed limits for urban and residential areas are too high. High vehicle speeds also increase the emissions of several exhaust pollutants. High-speed roads sever communities, and otherwise distort land use functions. They facilitate longer journeys which can only generally be made by car, and encourage demands for more roads while traffic demand continues to outstrip road supply. Many solutions are available now to free society from speed culture. They require political will, so that local and central governments can act on them. They include: (1) ending company car subsidies; (2) diverting most roads programme funds to public transport, traffic reduction policies, traffic calming, encouragement of walking and cycling; (3) implementing a carbon tax for motorists; (4) incorporating full environmental accounting in the evaluation of transport schemes.

TITLE: COMMUNICATIONS. THE EFFECT OF VEHICLE SPEEDS ON EMISSIONS

AUTHOR(S): FERGUSSON-M (EARTH RESOURCES RES, LONDON, UK)

SOURCE: ENERGY POLICY. 1994/02. 22(2) pp103-6 (11 Refs.)

PUBLISHER: BUTTERWORTH-HEINEMANN LTD, LINACRE HOUSE, JORDAN HILL, OXFORD, OX2 8DP, UNITED KINGDOM

PUBLICATION YEAR: 1994  
ISSN: 0301-4215  
LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: Recent vehicle speed surveys provide greater detail and accuracy than previously, and suggest a dramatic increase in excessive speeds on UK roads. As vehicles travel faster, the energy required to overcome aerodynamic drag increases approximately exponentially, and becomes the dominant term in total fuel use. The ERR Transport Emissions Model was used to calculate the additional energy consumed, and the potential savings from enforcing or reducing speed limits. The results suggest that 3.1% of car CO<sub>2</sub> emissions (0.6 Mt C) could be saved if current speed limits were enforced, or 7% (1.4 Mt C) if a maximum limit of 50 mph were imposed.

TITLE: TRANSPORT PLANNING AND POLICY: THE DANISH EXPERIENCE

AUTHOR(S): JOERGENSEN-CH (COWICONSULT, LYNGBY, DENMARK); KRAWACK-S (COWICONSULT, LYNGBY, DENMARK); SOERENSEN-MM (COWICONSULT, LYNGBY, DENMARK); THERKELSEN-H (COWICONSULT, LYNGBY, DENMARK)

SOURCE: INDUSTRY AND ENVIRONMENT. 1993. 16(1/2) pp11-4 (4 Refs.)

PUBLISHER: UNITED NATIONS ENVIRONMENT PROGRAMME, INDUSTRY AND ENVIRONMENT PROGRAMME ACTIVITY CENTRE, TOUR MIRABEAU, 39-43 QUAI ANDRE-CITROEN, PARIS, CEDEX 15, 75739, FRANCE

PUBLICATION YEAR: 1993  
REPORT NUMBER(S): 0378-9993  
LANGUAGE OF DOCUMENT: ENGLISH  
LANGUAGE OF SUMMARY: FRANCAIS; ESPAGNOL

ABSTRACT: A study of the Danish transportation system 'Danish Transport 2010' is described which examined various strategies for reducing air pollution and achieving energy savings. Strategies included: a) increased energy efficiency, b) tighter requirements for emissions, c) lower speed limits, d) traffic management, e) car pooling, f) increased truck loads, g) shift to public transport, h) shift to walking and cycling, i) shift of freight to rail, j) electric vehicles, k) trolley buses, l) methane as fuel and m) alcohol as fuel. A graph shows the results of changes to energy consumption and emissions of CO<sub>2</sub>, HC, NO<sub>x</sub> and particulates for the year 2010. Only energy efficiency and restricted emissions had a significant effect. The effect of combining actions is considered. Reductions of energy consumption and emissions within Danish goals appear feasible although this does not allow for any growth in traffic demand.

TITLE: THE EFFECT OF VEHICLE SPEED ON EMISSIONS. AN UPDATE USING 1991 SPEED DATA

CORPORATE AUTHOR(S): WORLD WIDE FUND FOR NATURE;  
FRIENDS OF THE EARTH

SOURCE: 1992/08. pp- (8 Refs.)

PUBLISHER: EARTH RESOURCES RESEARCH, 258  
PENTONVILLE ROAD, LONDON, N1 9JY, UNITED KINGDOM

PUBLICATION YEAR: 1992

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: This report presents revised calculations of the excess UK vehicle emissions, resulting from high speeds, and of the savings which could be obtained by policies to enforce or reduce speed limits. The calculations use the latest vehicle speed measurements by the Department of Transport (DOT), which provide more detail and statistical accuracy than were previously available, and are based on results from regular monitoring at nine motorway sites, three dual-carriageway sites and 16 single-carriageway sites in non-built-up areas. In the analysis, vehicles were allocated to one of eight possible speed bands, and one (or sometimes two) of ten vehicle categories. The principle results of the modelling exercise are tabulated and discussed in detail. The results for reduction of carbon dioxide emissions, from better speed restrictions, were found to be significantly more than previously estimated. Enforcing speed limits or imposing mechanical speed limiters could reduce these emissions by 3%. Lower speed limits could reduce them by 7%. Estimates of nitrogen oxide emissions from cars were increased. Speed limit enforcement, traffic speeds and traffic movements are also discussed.

TITLE: CALCULATION OF THE OPTIMAL DRIVING SPEED OF CARS  
AND LORRIES (MINIMAL EMISSIONS AND FUEL CONSUMPTION) ON  
HIGHWAYS WITH DIFFERENT SPEED LIMITS. (BEREKENING VAN DE  
OPTIMALE RIJSNELHEID VAN PERSONENAUTO'S EN VRACHTWAGENS  
(MINIMALE EMISSIES EN VERBRUIK) OP WEGEN MET VERSCHILLENDE  
SNELHEIDSLIMIETEN.)

AUTHOR(S): DEN-TONKELAAR-WAM (TNO-MW)

SOURCE: 1991/11/08. (R 91/315) 31P (13 Refs.)

PUBLISHER: TNO MILIEUWETENSCHAPPEN TNO-MW, PO BOX  
6011, DELFT, 2600 JA, NETHERLANDS

PUBLICATION YEAR: 1991

LANGUAGE OF DOCUMENT: DUTCH

ABSTRACT: Calculations have been made for the policy regarding speed limits for cars and lorries to get the lowest emissions and fuel consumption. Research has been done on motorways with speed limits from 50-130 km/h for cars and 50-100 km/h for lorries, highways with speed limits from 30-80 km/h, and roads in urban areas with speed limits from 10-50 km/h. Emissions from the polluting components such as nitrogen oxide, hydrocarbons, carbon dioxide and sulphur dioxide, are calculated. It is shown that a reduction of the emissions and fuel consumption can be achieved by decreasing the speed limits for cars and lorries on motorways. Optimal speeds should be 70 km/h for cars and 60 km/h

for lorries. Besides the modification of the speed limits improvements can be achieved by a better traffic flow in particular in urban areas. Driving behaviour has also its influence on emissions. It is obvious that "quiet" driving behaviour, dependent of the situation and the use of an exhaust catalyser, is 35-85 percent lower than "wild" driving.

TITLE: SPEED LIMITS, EFFECTS AND BENEFITS IN TERMS OF ENERGY EFFICIENCY AND REDUCTION OF EMISSIONS.  
AUTHOR(S): DEN-TONKELAAR-WAM (TNO DIVISION OF TECHNOLOGY FOR SOCIETY)  
SOURCE: FREIGHT TRANSPORT AND THE ENVIRONMENT. 1991. pp261-270 (8 Refs.)  
PUBLISHER: ELSEVIER SCIENCE PUBLISHERS B V, P O BOX 211, AMSTERDAM, 1000 AE, NETHERLANDS  
PUBLICATION YEAR: 1991  
REPORT NUMBER(S): 0-444-88770-9  
LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: The driving speed of a car influences the fuel consumption and emission of air polluting substances. On 1 May 1988, a system of differentiated speed limits for passenger cars and light duty vehicles on motorways was introduced in the Netherlands, among other things for the purpose of reducing environmental pollution. On particular sections of the Dutch motorways a limit of 100 km/h is in force, on the rest one of 120 km/h. (Lorries 80 km/h on all motorways). Prior to and after introduction of the new system of speed limits the fuel consumption and the NOx, CO, CO2 and hydrocarbon emissions from passenger cars and lorries on motorways have been calculated based on the actual driving speeds on both types of road sections. The emission behaviour at different vehicle speeds has been derived from field tests on roller-type test stands in combination with measurements on German motorways under actual driving conditions. After an initial sharp decrease in driving speed after 1 May 1988, resulting in lower fuel consumption and emissions, the speeds have slowly increased again, with the result that benefits have largely disappeared already.

TITLE: REDUCING CARBON DIOXIDE FROM TRANSPORT: A COSTED STRATEGY.  
AUTHOR(S): HOWARD-D  
CORPORATE AUTHOR(S): TRANSNET  
SOURCE: 1991/09. 35P  
PUBLISHER: GREEN PARTY, 10 STATION PARADE, BALHAM HIGH ROAD, LONDON, SW12 9AZ, UNITED KINGDOM  
PUBLICATION YEAR: 1991  
LANGUAGE OF DOCUMENT: ENGLISH

**ABSTRACT:** This study was commissioned by the Green Party and undertaken by Transet. The aims of the study are: 1) to calculate the reductions in United Kingdom transport sector CO2 emissions possible from a range of Green Party transport policies, and 2) to estimate the costs to central and local government of instituting such policies. Using a Lotus 1-2-3 spreadsheet, a model has been devised to estimate the impact of various policies on CO2 emissions. The following policies were examined: a) a ban on all cars over 1500cc in capacity; b) a reduction in the maximum speed limit to 50 mph, together with greater enforcement; c) a ban on the advertising of cars except at the point of sale; d) a publicity campaign to encourage people away from cars, or to drive their cars more responsibly; e) taxing the provision of company cars and company provided parking in the same way that income is taxed; f) higher parking charges, a reduction in parking and greater enforcement; g) major increases in the provision of traffic calming throughout UK cities and towns; h) cancellation of the current planned road building programme, and road spending reduced to essential spending only; i) a major transfer of freight away from lorries to more energy efficient modes such as rail and water; j) major increases in provision of public transport and better facilities for cyclists and pedestrians; k) an immediate rise in fuel taxation of 15p per litre for petrol and 7.5p per litre for diesel, and l) in 1997, a major new tax on petrol and diesel to replace existing fuel and vehicle excise and to recover the full costs to society of cars and lorries; this would result in the prices of these fuels more than trebling.

**TITLE:** TRAFFIC, ENERGY AND CARBON DIOXIDE. STRATEGIES FOR THE REDUCTION OF FUEL CONSUMPTION AND EXHAUST EMISSIONS. (TRAFIK, ENERGI OCH KOLDIOXID. STRATEGIER FOER ATT REDUCERA BRAENSLEFOERBRUKNING OCH KOLDIOXIDUTSLAEP.)

**CORPORATE AUTHOR(S):** TRANSPORTRAADET

**SOURCE:** TRANSPORTRAADET RAPPORT. 1990. (1990:11)

102P+APP

**PUBLISHER:** TRANSPORTRAADET, BOX 1339, SOLNA, S-17126, SWEDEN

**PUBLICATION YEAR:** 1990

**ISSN:** 0280-1183

**LANGUAGE OF DOCUMENT:** SWEDISH

**ABSTRACT:** The environmental policy goal is that discharge of carbon dioxide should not increase beyond 1988 levels. This is unlikely to be achieved unless special measures are taken; discharge in 2000 will probably exceed 1988 levels by 2.8m tonnes, and in 2020 by 7m tonnes. For levels in 2000 to be same as in 1988, the strategy decided on should include: increased engine efficiency, optimisation of traffic lights, reduction of speed limits, electronic speed surveillance, 50% use of biomass based ethanol by local and regional bus traffic, the same by heavy distribution vehicles in towns, use of 5.5% ethanol admixture in petrol, expansion of rail traffic and transfer of goods to rail, better public transport in town, better driving and use of energy recovery in town buses. If

carbon dioxide discharge is to be 10% below 1988 levels, there must be extended use of ethanol to 90% of local and regional bus traffic and distribution vehicles, changes in taxation regarding use of private cars for journeys to work, and automatic traffic control. Investment in better traffic systems and public transport has great positive national economic effects apart from energy and environmental gains. The effects of the different measures must be monitored.

TITLE: TRAFFIC AND EXHAUST EMISSIONS - A FORECAST UP TO THE YEAR 2015. CALCULATION OF EMISSIONS ON THE BASIS OF DIFFERENT ASSUMPTIONS. (TRAFIK OCH AVGASUTSLAEP - UTBLICK MOT 2015. BERAENKNING AV AVGASUTSLAEP UNDER OLIKA FOERUTSAETTNI GAR.)

AUTHOR(S): THUNBERG-B (VTI); HAMMARSTROEM-U (VTI); KARLSSON-B (VTI); MOELLER-S (VTI); PERBY-H (VTI)

SOURCE: VTI MEDDELANDE. 1990. (618) 62P+APP (11 Refs.)

PUBLISHER: STATENS VAEG- OCH TRAFIKINSTITUT, LINKOEPING, S-58101, SWEDEN

PUBLICATION YEAR: 1990

ISSN: 0347-6049

LANGUAGE OF DOCUMENT: SWEDISH

ABSTRACT: This report principally describes the emissions of road traffic in Sweden up to the year 2015. Emissions have been calculated on the basis of different assumptions regarding vehicle's emission levels, economic growth, taxes and tolls imposed on traffic and the public transport services offered. The effect of changes in vehicle speeds is also described. The report discusses aspects and views of problems that should influence and control the choice of measures against traffic emissions. The Swedish Parliament has set up targets for emissions of certain substances, including nitrogen oxides and carbon dioxide. Two of the principal conclusions in this report have a bearing on these targets: (1) It will probably be easier to achieve the target for nitrogen oxides than the target for carbon dioxide. (2) To fulfil these goals, further emissions control measures will be required in addition to those already decided upon. However, with the range of actions available, there are good prospects of fulfilling not only the politically established targets but also in the long term more stringent demands from environmental researchers.

TITLE: CONTRIBUTION OF ROAD TRANSPORT TO GREENHOUSE GASES: NEAR AND LONG TERM PROSPECTS OF REDUCTION.

AUTHOR(S): WATSON-HC (UNIVERSITY OF MELBOURNE. DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING); WATSON-CR (LA TROBE UNIVERSITY. DEPARTMENT OF SCIENCE)

SOURCE: SAE AUSTRALASIA. 1990/03/04. 50(2) pp36-40 (9 Refs.)

PUBLISHER: SOCIETY OF AUTOMOTIVE ENGINEERS,  
AUSTRALASIA, 191 ROYAL PARADE, PARKVILLE, VICTORIA, 3052,  
AUSTRALIA

PUBLICATION YEAR: 1990

ISSN: 0036-0651

LANGUAGE OF DOCUMENT: ENGLISH

ABSTRACT: Preliminary estimates are made at the likely contributions from various sectors of land transport activity to the greenhouse gases using assumptions about the aggregate performance of the vehicle population and its dynamics. Whilst the estimates of the CO<sub>2</sub> contribution are likely to be more reliable, there are much greater uncertainties in the values of methane and nitrous oxide because of the lack of recent measurements of these components in vehicles' emissions studies. In the analysis, the growth in demand for passenger and goods transport, which would naturally lead to an increase in fuel consumption and hence the emission of greenhouse gases, is counteracted by more energy efficient vehicle designs and the implementation of management and planning strategies. Three basic scenarios are examined: do nothing; an extrapolation of existing trends; and a best technological effort program. These are supplemented by examples of governments' action such as the introduction of 80 km/h speed limits and restriction on the size of cars sold. The analysis for cars indicates it is possible that the combination of actions could lead to a 35 per cent reduction in greenhouse gases in a 15 year time frame. However, for trucks the possibility of reducing greenhouse gas emission will be a major challenge. The results should be regarded as setting a background for more detailed studies related to costs and better estimates, and particularly of the methane and nitrous oxide contributions

TITLE: THE INTRODUCTION OF A NEW POLICY OF SPEED LIMITS ON  
MOTORWAYS ON THE EMISSION OF AIR POLLUTING MATERIALS. (DE  
INVLOED VAN HET INVOEREN VAN EEN NIEUW  
SNELHEIDSLIMIETENBELEID OP AUTOSNELWEGEN OP DE EMISSIES VAN  
LUCHTVERONTREINIGENDE STOFFEN.)

AUTHOR(S): DEN-TONKELAAR-WAM (HOOFDGROUP  
MAATSCHAPPELIJKE TECHNOLOGIE TNO)

SOURCE: 1987/12. 14P (2 Refs.)

PUBLISHER: NEDERLANDSE ORGANISATIE VOOR  
TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO, PO BOX  
217, DELFT, 2600 AB, NETHERLANDS

PUBLICATION YEAR: 1987

LANGUAGE OF DOCUMENT: DUTCH

ABSTRACT: AS FROM MAY 1, 1988, THE DUTCH GOVERNMENT  
WILL INTRODUCE A SYSTEM OF DIFFERENTIATED SPEED LIMITS FOR  
CARS ON MOTORWAYS. ON PART OF THE ROAD SECTIONS THE LIMIT  
WILL BE MAINTAINED ON 100 KM/H; HOWEVER ON A LARGE  
PROPORTION THE LIMIT WILL BE INCREASED INTO 120 KM/H. THE SPEED

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LIMIT FOR LORRIES WILL NOT BE MODIFIED. THE INTRODUCTION WILL BE COINCIDENT WITH AN INCREASED ENFORCEMENT POLICY FOR BOTH CATEGORIES. THE NEW POLICY WILL MODIFY VEHICLE SPEED ON MOTORWAYS AND THEREFORE WILL INFLUENCE THE EMISSION OF POLLUTANTS. IN THIS STUDY, THE AMOUNTS OF NITROGEN OXIDE, CARBON MONOXIDE AND HYDROCARBON EMISSIONS ARE MEASURED IN ORDER TO OBTAIN VALUES FOR THESE BEFORE THE NEW LAWS ARE INTRODUCED.

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