To:	Transport & Health Policy Makers, & Practitioners
From:	Prof Adrian Davis, TRI, Edinburgh Napier University
Date:	9th August 2019
Subject:	Essential Evidence 4 Scotland No. 15 Induced Demand and bias in favour of road construction

Top line: The costs of providing increased road capacity are underestimated and the benefits exaggerated in existing traffic modelling when traffic volumes are underestimated, not least by ignoring the loss of time savings and increased environmental costs.

Although the phenomenon of induced traffic has been theorized for more than 60 years and is now widely accepted among transport researchers, the traffic-generating effects of road capacity expansion are still often neglected in transport modelling. Such omission can lead to serious bias in environmental impact assessments as well as the economic viability of proposed road projects, especially where there is latent demand for more road capacity.

Traffic model simulations for a project in Copenhagen[1] illustrate the point made by Litman[2] that a small amount of induced traffic can have a disproportionately large effect on the cost effectiveness of a road project. This is especially so in congested transport corridors, because of non-linear speed flow relationships and typically small net differences between large costs and large benefits. In such situations, underestimation of traffic demand resulting from failure to take induced traffic into account results in appraisals that, ceteris paribus, favour capacity expansion to a larger degree than if this effect is accounted for. The effect is especially crucial in the calculation of travel time savings, as the increased traffic volumes eat up much of the expected utility gains from capacity expansions. There might be a larger total number of drivers benefiting from the new capacity, but the benefit per driver is significantly reduced due to congestion forming much earlier than anticipated.

In the short term the extra traffic leads to benefit shortfalls in the form of longer travel times, which is problematic for the validity of appraisals (particularly Cost Benefit Analysis). In the long term it leads to even further benefit shortfalls for time savings, but also severe underestimation of the adverse environmental effects of facilitating continued growth in urban vehicle traffic. As a consequence, appraisals of capacity expansion picture such projects as better investments than is actually the case, which likely results in them being prioritized to a larger extent than they would be if the costs and benefits had been more adequately assessed. The results clearly show a significant overestimation of benefits from road building in appraisals that fail to account for induced demand.

Although model-based forecasts, and the cost-benefit analyses in which they are used, do not influence decisions about project implementation in a one-to-one manner, a systematic overestimation of benefits and underestimation of adverse environmental effects generally tend to legitimize a high spending of society's resources on road construction. They also tend to delegitimize environmental opposition and disarm environmentalists of their arguments. Motorway construction can thus be supported by transport model forecasts ignoring induced traffic, and it is even portrayed as a suitable approach to reduce greenhouse gas emissions.

[1] Næss, P., Nicolaisen, M. S., & Strand, A. (2012). Traffic forecasts ignoring induced demand: a shaky fundament for cost-benefit analyses. *European Journal of Transport and Infrastructure Research*, 12(3), 291-309.

[2] Litman, T. 2011. Generated Traffic and Induced Travel. Implications for Transport Planning. Victoria Transport Policy Institute, Victoria.