



18 November 2013

The Rt Hon Patrick McLoughlin MP
Secretary of State for Transport
Department for Transport
Great Minster House
33 Horseferry Road
London
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Dear Secretary of State,

Review of elements of methodology for HS2 business case

I write with my review of specific elements of the methodology used to estimate the economic benefits arising from High Speed 2.

I should begin by giving you some information about myself and the nature of this review. My academic background is as a mathematician, and I served as Chief Scientific Advisor to the Department for Transport from 2003-2006. During that period I learned something of the Department's appraisal methodology, both through the appraisal of science and technology initiatives and through the mathematical and statistical models that form part of the methodology. It was perhaps because of this prior knowledge that I was approached in early October. Since then I have, with the helpful support of staff from DfT and HS2, reviewed three of the significant changes to the calculation of the economic benefits generated by HS2. Using the terminology of the Macpherson Review of quality assurance of Government analytical models, I have conducted an external peer review (a formal or informal engagement of a third party to conduct critical evaluation, from outside the organisation in which the model is being developed).

Before I come to the specific questions addressed in my review I should make a general comment on analytical models. I very much welcome the inclusion in the Economic Case for HS2 (October 2013) of a distribution of benefit cost ratios, reflecting the inherent uncertainty around several of the model inputs. Models necessarily make simplifications and approximations, and when assessing whether a model is adequate the resulting errors need to be seen in the context of the inescapable uncertainty about any prediction of the future. When assessing whether a model is adequate, we need to



bear in mind the use to which it is put and accuracy that is expected of its forecasts. All models are wrong, but some are useful (George Box, statistician).

The first question addressed in my review concerns the estimates of base year rail demand matrices, used as input to forecasts of future demand between different places for various purposes. The new estimates of base year rail demand matrices are, in my view, an improvement on the earlier derivation.

The second question addressed in my review concerns the benefits calculation. Over the central issue, my recommendation is that benefits be calculated at the most disaggregated level and that numerical integration be used rather than the 'rule of a half' where changes are large. The benefit calculation is made more difficult as a consequence of using different weights for demand modelling and for appraisal, and the review makes several further recommendations related to this. In particular, presentation of just how the benefit arises could be greatly improved.

The third question addressed in my review concerns inflation, and the change in the measure used to convert between nominal and real values from RPI to the ONS GDP deflator. I have not conducted a model audit, but I have looked through the spreadsheet calculations. In my view the adjustment has, given estimate the model assumptions on fares increases and on demand elasticity, now been made appropriately.

Yours sincerely,