

Taxation Futures For Sustainable Mobility Project

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This document is a submission from the research team of the ESRC funded Taxation Futures For Sustainable Mobility Project to the Department for Transport as part of the consultation on ‘road fuel gases and their contribution to clean low-carbon transport’.

1. The Government is currently conducting a review of all aspects of its future support for liquefied petroleum gas (LPG) and natural gas used as road fuels to make certain that both fuels reflect “the UK’s carbon, air quality and other policy objectives in a close, consistent and durable way” (DfT 2003, Para 13). In conjunction with the Powering Future Vehicles Strategy, the review will be used to “ensure the continued development of appropriate taxation of low carbon vehicles and fuels....” (DfT 2003, Para. 30).
2. The consultation document raises a number of key questions on which the Government is seeking views (DfT 2003, Para. 35). This submission comments on two particular issues: What tax and other measures would be most effective in supporting the wider use of clean gas vehicle technologies? How can Government support be better linked to environmental outcomes?

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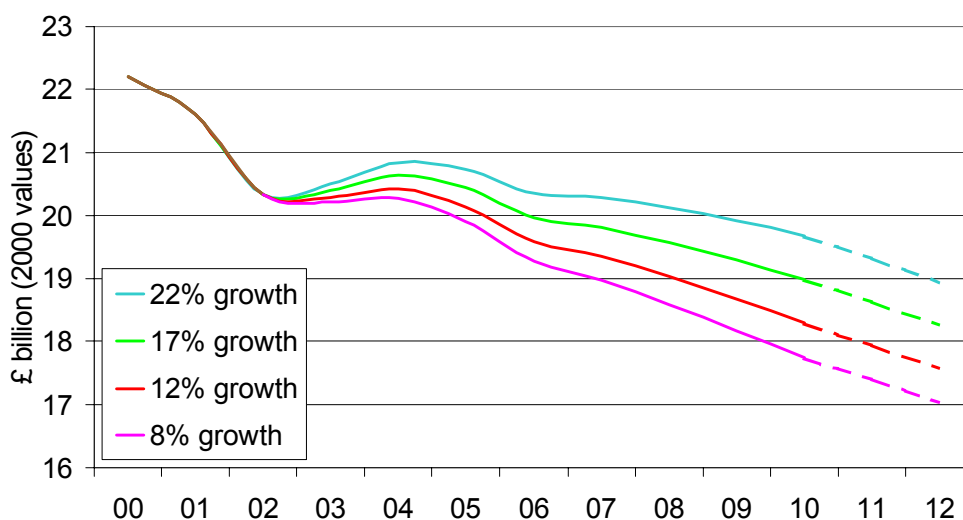
3. The Taxation Futures For Sustainable Mobility Project is one of fifteen projects funded by the ESRC’s Environment and Human Behaviour Programme. The aim of the programme is to more fully understand why people behave towards the environment as they do and how these behaviours might be changed. Issues raised by the programme include the key question: What public policy approaches might persuade people to change their behaviour and to change their behaviour in ways that are least costly for society as a whole? The Taxation Futures project is the only project in the programme that specifically addresses transport issues.
4. Personal mobility is a particularly difficult environmental policy area. Economic instruments are widely advocated to address environmental impacts and research shows the impossibility of sustainable mobility without efficient price signals (CEC 1995). However, changes to UK transport taxation to affect human behaviour have had mixed success and often generate powerful political opposition. This was demonstrated by the fuel duty protests of September 2000. Subsequently government has reduced road fuel and vehicle taxation and has moved towards tax concessions to low carbon vehicle technologies.
5. It is instructive to note that the pricing structure within the existing UK transport tax regime was originally introduced to raise revenue and was not intended to act as a pricing signal to influence behaviour. Over the past decade, the existing fiscal instruments have been modified with the objectives of promoting modal change and supporting the introduction of cleaner fuels such as road fuel gases. However, instead of modifying existing tax measures, the question arises whether a different car taxation structure might be more effective in providing behavioural change signals, maintaining government revenues, *and* be politically acceptable?

6. The aim of the Taxation Futures project is to explore different ways in which the UK car taxation and charging regime could be structurally altered to be more effective in delivering Government policies. The project includes the following activities: (1) Estimating the changes in UK government revenues from motoring taxation if energy efficient cars and alternative fuels become widespread; (2) Modelling the tax concessions to establish low carbon cars in the UK; and (3) Modelling the impact on UK traffic and emissions of a fiscally-neutral replacement of existing motoring taxes by a distance charging system.
7. Although the Taxation Futures project is not due to produce a final report until January 2004, it has already generated a number of findings relating to activities (1) and (2) that are of direct relevance to the road fuel gases consultation process. These findings are now summarised in the following paragraphs.

Initial Research Findings 1

8. Building on previous research, the Transport Futures project makes detailed projections of UK motoring tax revenues from the car sector over the period up to 2012 (Parkhurst 2002). This modelling assumes the continued use of graduated vehicle exercise duty (VED), fuel excise duties (FED), ‘alternative’ vehicle subsidies, company car taxation policy, and the continuing implementation of EU-ACEA emission targets for new cars (fleet average of 140 gCO₂/km by 2008). It also assumes the increasing market penetration of road fuel gases, which are taken to represent 3% of total car-kilometres in 2005 and rising to a maximum of 10% in 2010. Four levels of future traffic growth are investigated using projections taken from the Ten Year Transport Plan (DETR 2000). The modelling assumes that FED and average VED rates increase in line with inflation.
9. The initial observation is that, over the period 2000-2002, annual car tax revenues (VED, FED and VAT) decreased due to FED reductions and the introduction of the new graduated VED system (see Figure 1). The model predicts that, over the period 2003-2006, tax revenues recover part of the losses incurred between 2000 and 2002, such that annual revenues increase over this period. This increase is due to a growth in levels of traffic. Over the period 2006-2010, increasing fuel efficiency and the take-up of alternatively fuelled cars (predominantly LPG) lead, once again, to a decline in revenue. Although the projected levels of traffic growth affect the rate of decline, they are now not sufficient to compensate for the fall in revenue. If it is further assumed that the EU agreement continues towards a new car fleet average of 120 gCO₂/km by 2012, over the period 2010-12, the model predicts a continuing fall in revenue.

Figure 1: Effect of existing policies on UK car tax revenue 2000-2012



10. The projections for future tax revenue losses go well beyond the initial DfT 2002 estimate of £68 million due to the sale of around 170 million litres of LPG for road use (DfT 2003, Annex A, Para. 2). The Taxation Futures project predicts that by 2010, from a year 2000 baseline, *cumulative* losses are likely to exceed £20 billion (expressed in 2000 values). By 2012, cumulative car taxation revenue losses are likely to rise towards £30 billion (year 2000 values).
11. The research notes that there are many policy constraints on using tax rate increases (within the existing regime) to overcome the trends identified for the period 2006-2012, with perhaps the greatest restriction being experience of the fuel protests of 2000. By increasing fuel duties on petrol and diesel, the Government would risk rekindling this controversy and increase the road transport sector's vulnerability to future changes in world oil price. Furthermore, as new cars become more efficient, increases in duty rates would disproportionately penalise those motorists who own older cars.
12. While increasing taxes on road fuel gases would regain some revenues, this would reverse the existing price signals that have been so successful in stimulating the uptake of road fuel gases in the UK car sector. Reducing fuel duty differentials on road gas fuels would also disadvantage those car owners who have already invested in road fuel gas technologies. A significant tax increase on road fuel gases without killing the market would only be possible if the product cost was to fall.
13. Therefore, the first conclusion reached by the Taxation Futures project is that current car taxation policies (combined with modest success in limiting traffic growth and fuel consumption) would result in a significant reduction in annual car tax revenues over the period 2006-2012. This reduction will be difficult to address without amending the current tax regime.

Initial Research Findings 2

14. Although beyond the immediate scope of the current consultation on road fuel gases, the Taxation Future project is also investigating the impact of the current car taxation system on the introduction of other alternative fuels. The project highlights the increasing difficulty the current tax regime will have in supporting a growing number of alternative road fuels, which, in the future, are likely to include electricity and hydrogen. Interesting questions raised include: How could fuel duty be raised on electricity sourced from a domestic supply (currently untaxed save for VAT)? Also, how can hydrogen be fairly taxed when it can be generated from a large number of renewable and non-renewable energy sources?
15. To extend its investigation into the long-term, the Taxation Future project is examining the potential of using current tax structure to encourage the uptake of hydrogen fuel cell vehicles in the UK. The results are of relevance to the current consultation as they confirm and extend the argument for restructuring the tax regime in the light of the increasing use of road fuel gases and improving engine efficiencies. To explore future revenue issues, the Taxation Futures project estimates the impact on revenue streams for two future scenarios: (1) hydrogen fuel cell cars account for 10% of car sales in 2012 (the 'low carbon' vehicle sales target) and (2) hydrogen fuel cell cars account for 10% of the total car fleet beyond 2012.
16. The modelling is based on data from established sources including Arthur D. Little, Ricardo Consulting Ltd. and the Imperial Centre for Energy Policy and Technology (Hart *et al.* - see reference list). The model assumes hydrogen is produced at fuel stations (on-site) from either reformed natural gas or small-scale electrolysis units at 1000 hydrogen fuel stations with at least 200 cars per site. Projected hydrogen fuel costs are in the range 1.30–5.17 £/kg (2000 values) and

car capital costs are taken to be 1.16-1.53 higher than a Euro 5, 120 gCO₂/km petrol baseline vehicle. Revenue streams and costs modelled include FED, VED and car purchase subsidies.

17. The main findings are as follows: With fuel cell cars representing 10% of car sales in 2012 and zero fuel tax on hydrogen (the current 'rate'), the predicted annual revenue losses amount to around £100 million (year 2000 values). This is effectively the cost of stimulating the fuel cell car market at this scale. Raising tax on hydrogen to its maximum extent without losing all price incentives (to 75p/kg) reduces losses but continues to result in an annual revenue loss of £90 million. Beyond 2012, if fuel cell car numbers rise to 10% of the total fleet, a 75p/kg fuel tax on hydrogen leads to annual revenue losses of around £1 billion. Increasing fuel duty on hydrogen to 158p/kg (equivalent to current duty on diesel on an energy basis) leads to some recouping of costs but continues to result in revenue losses of over £750 million per annum.
18. Therefore, the second main conclusion of the Taxation Futures project is that it is not possible to successfully introduce fuel cell cars in significant numbers in the UK without incurring significant losses to car tax revenues using the current tax regime.

Summary of main points for road fuel gases consultation

19. In the UK, there have been substantial practical and political difficulties in using economic instruments to encourage more sustainable forms of transport. Policy seems to have shifted away from attempting behavioural change to providing tax concessions on cleaner fuels and vehicles. However, as cleaner fuels gain market share and conventional engine efficiency improves, the consequence of this approach is that car tax revenues have started to fall, and are projected to dramatically decline from 2006 onwards.
20. As car ownership has become such a central feature of UK society, it is increasingly difficult for any Government to set conventional vehicle or fuel taxation at a level that produces significant behavioural change. Furthermore, simply increasing rates on petrol and diesel is beginning to appear as a short-term and unstrategic response to events. Recouping revenue by reducing incentives already provided to cleaner fuels (such as road fuel gases) only serves to dampen market interest and penalise car owners who have responded positively to existing price signals.
21. Therefore, the Government's review of road fuel gases needs to include a consideration of the overall approach to car taxation and the promotion of cleaner fuels. The Taxation Futures project clearly shows that the current car taxation system includes two contradictory objectives; it is unable to promote more sustainable road technologies while also maintaining current tax revenues. Instead, this submission contends that, as part of reviewing incentive measures for road fuel gases, a structural review of the car taxation system is required.
22. One possibility for a new car taxation system is currently being explored by the Taxation Futures project. This involves replacing the taxation system wholly or partly with a charging system based on distance driven. In principle, the advantage of this approach is that a taxation regime can be designed that can account for any number of the following factors: vehicle emissions, vehicle performance, vehicle type, fuel type, road location, level of congestion, time of travel, and direction of traffic flow. Faced with the seemingly intractable issues already discussed, this might provide the Government with an ideal opportunity to maintain or increase road tax revenues *and* deliver price signals capable of effecting real modal and technological change.

Taxation Futures for Sustainable Mobility – Future Work

23. The Taxation Futures project is on-going and is due to report in early 2004. A series of scenarios are continuing to be developed and assessed to ascertain their levels of tax revenue generation and ability to deliver effective environmental signals to car users. A version of the Dutch 'Mobility Explorer' model is being used to provide a detailed estimate of the transport and environmental effects of the different tax scenarios. The project will conclude with a series of seminars to users to be held in early 2004 and the production of a final project report.

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