



# ROAD MILES

## MILES BETTER, FAIRER, GREENER, SAFER

2017 Wolfson Economics Prize Submission

Deirdre and Edmund King

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How Can We Pay For Better, Safer, More Reliable Roads In a Way That is Fair To Road Users and Good For the Economy and the Environment?



WOLFSON

**ECONOMICS PRIZE**

— MMXVII —

ROAD MILES

MILES BETTER, FAIRER, GREENER, SAFER



## Deirdre and Edmund King

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### Road Miles

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Edmund King has 25 years' experience as a transport and motoring campaigner. He has worked for the British Road Federation and various motoring organisations and think tanks. He is Visiting Professor of Transport at Newcastle University and the AA president. Last year he received an OBE for services to road safety.

The Wolfson Economic Prize invites entrants from around the world and all sorts of backgrounds to propose original, well-argued and informed solutions to big national challenges. The aim is to bring forward fresh thinking to help people, governments and businesses develop practical policies.

This year the prize addresses an issue at the heart of every country's economic future: road infrastructure, and

how can we pay for better, safer,  
more reliable roads in a way that is  
fair to road users and good for the  
economy and the environment?

The way cars are powered, driven and owned is being revolutionised. Soon a world of cleaner, automated vehicles will arrive and old annual charges and petrol taxes will no longer work. A new kind of driving will take a new kind of road and a new kind of funding – ideas needed not just in Britain but around the world.

The five shortlisted submissions – of which this is one – show that it is possible to come up with potential answers that can help road users, improve safety, protect the environment, and support our economy.

## Prize Team



SIR JOHN KINGMAN

Chairman of the  
Judging Panel



BRIDGET ROSEWELL  
OBE

Judge



LORD DARLING

Judge



LORD WOLFSON

Founder



ISABEL DEDRING

Judge



JULIAN GLOVER  
OBE

Prize Director



LORD FINKELSTEIN

Judge

## What Happens Next

Shortlisted entrants will be offered the chance to submit a revised and expanded submission. Shortlisted entrants are free at this stage to join up with others to help develop their proposals, including entrants whose submissions were not shortlisted.

These finalists will be given until June 2017 to expand their submissions before the Judges consider the winner. All shortlisted entrants who provide expanded submissions will receive £10,000. The winning entry, designated by the judges, will receive £250,000 in total. The Judges expect to announce the winner in July 2017.

The Judges also have the discretion to award further smaller prizes to recognise entrants whose submissions address aspects of the Prize Question in innovative, creative or otherwise outstanding ways, in particular giving weight to the use of technology. The winners of any such awards may not comprise a full entry for the £250,000 prize.

[The Judges' decision is final.](#)

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# Non-technical Summary

“How can we pay for better, safer, more reliable roads in a way that is fair to road users and good for the economy and the environment?”

Our answer is [Road Miles](#).

[Road Miles](#) could be introduced within a year and would be fair, fun and popular.

[Road Miles](#) will pay for safer more reliable roads that are good for the economy and the environment. Road Miles will not raise data privacy concerns and will help support economic activity in depressed areas.

## How?

Drivers in the UK would be allocated at least 3,000 FREE Road Miles for one vehicle registered in their name. This gives them free access to the road network. Fuel duty will be reduced and vehicle excise duty would be revised to further support the transition to cleaner, greener vehicles.

After 3,000 miles, registered vehicle keepers would be charged a modest mileage rate. Car drivers in the first year would pay less than 1p per mile. Mileage would be checked twice a year at MoTs or authorised services. Customers can also update their accounts with their own speedometer readings.

There would be concessions for those living in the most remote rural areas and incentives for early switching to greener vehicles.

## Extra income?

Extra road income will be generated from a nationwide [Road Miles Lottery](#) with prizes including free Tesla electric cars and free Road Miles. Income would help keep Road Mile costs down; fund some pothole repairs, and help support local bus services.

The [Road Miles Auction](#) will allow companies to bid for Road Miles that they can offer to their customers via promotions. For example, Ford may wish to offer 500 free Road Miles with every purchase of the Hybrid Focus

[Road Miles Adopt-a-Highway](#) would allow companies to bid for naming rights of major roads, for example, we could see the [Adidas A1](#) and provision of Adidas Astroturf at Scotch Corner Adidas Services.

## Government Revenues?

Financial model projections of Total [Road Mile Revenues](#) are above current Government motoring revenue, by an average 4.4% pa (£1.4 billion) over the forecasted period.

## Popular?

The scheme will be [popular](#). In a recent Populus poll of 9,000 drivers two thirds of drivers (63%) chose Road Miles as the most popular option of paying for road use.

Drivers will be real [customers](#). They will be compensated with free [Road Miles](#) for over- running roadworks or excessive delays in re-opening roads.

The income will at least match today's motoring tax-take but [drivers will pay less](#) than they currently pay due to the extra commercial income.

[Road Miles](#) will be headed up by a popular “Motorists’ Champion” who will ensure that [road users get a say](#). The Road Miles Motorists’ Panel will be polled on a monthly basis on priorities for expenditure or preferred schemes.

## Safer?

Roads will be better. [Safety will be enhanced](#). Extra lay-bys will be built into ‘smart motorways’ to make them smart and safe. The most dangerous roads identified in the EuroRAP (road assessment programme) will be upgraded. At least £20 per head will be spent on cycle infrastructure.

## Reliable?

Encouraging HGVs to drive more at night will reduce congestion and increase road efficiency. ‘White van man’ will be given incentives to adopt more efficient delivery patterns.

Roads will be more [reliable](#). A greater emphasis will be given to more imaginative road tunnels and pinch point solutions such as doughnuts or half-hamburger roundabouts.

HOV (high occupancy vehicle) connected car lanes and semi-autonomous car lanes will be developed.



## Good for the economy?

Both the local and national economy will benefit from road transport costs remaining constant in real terms or decreasing. Consequently, transport costs as a percentage share of household income will fall, and companies and hauliers will see the benefit in their profit margins.

## Environmentally-friendly?

Urban road authorities will be able to implement low emission zones and other measures to enhance the local environment. Park & Share, Park & Cycle, Park & Connect with on-demand app technology will be encouraged.

Technological improvements including road induction pads and fast charging stations for EVs will be developed.

The [Road Miles](#) scheme will lead to a reduction in non-essential journeys, as drivers will be inclined to think twice about certain journeys when approaching [Road Mile](#) limits.

[Road Miles](#) will work.

ROAD MILES will be  
miles better, fairer,  
greener, safer.

# 1. Prologue

## Roads: Who needs them?

A space-traveller landing on planet UK would be surprised that, as a country dependent on roads for 85% of passenger travel and almost 90% of freight, proportionately more of our foresight and investment is going into high-speed rail.

Yet roads are the main means of getting from our homes to our destinations and for getting goods to our shops. Roads have transformed our country and our lifestyles. Roads and cars have revolutionized how we live, work and play.

Yet roads are often the much-maligned poor relation that gets a bad press. They are congested, dangerous, pot-holed and polluting...we are told.

They are also a liberating, convenient, efficient and sometimes joyful way of getting around. ...we are rarely told.

As author/historian Piers Brendon pointed out in [The Motoring Century](#):

“In 1890, the average distance a Briton travelled was 13 miles a year, whereas in 1990, it was 13 miles a day, nearly all that distance courtesy of the car. It has improved access to culture, leisure and health. It has encouraged the emancipation of women and augmented the freedom of men. It has reshaped cities, extended suburbs and opened up the countryside. However, the motorcar has always been a cause of contention.”

The Motoring Century:  
Story of the Royal Automobile Club  
17 Apr 1997 by Piers Brendon

The question is: How can  
we pay for better, safer,  
more reliable roads  
in a way that is fair to  
road users and good  
for the economy and the  
environment?

## 2. Preface

We recommend a new way to pay for roads that is fair to all road users, good for the economy, and good for the environment. It will address congestion, increase the efficiency of our current road network, and maintain Government motor tax revenues at or above current levels as the future heralds the growth of new emerging greener vehicles.

The benefit of the scheme is that it will be [popular](#).

It will be a future proof scheme that can [transcend future developments](#).

It will [capture the public imagination](#).

Every driver will benefit from an annual allocation of at least 3,000 FREE [Road Miles](#) – the exact amount dependent upon how green the car is, along with concessions for those in remote rural areas - and drivers will benefit from cheaper fuel prices, as duty will be radically cut by 20% over the short term before being frozen in Year 5, and eventually phased out.

Our proposal could be initiated within a year, as it will dovetail with the current way of paying for roads before transitioning to a stand-alone system as the traditional payment method falls away. Once the adoption of greener vehicles reaches saturation point, fuel duty becomes redundant.

Our proposal is primarily based on the annual distance travelled by every motorist, measured by [Road Miles](#), with a low charge per mile depending on vehicle

type<sup>1</sup>, combined with a Government [Road Miles Auction](#) to companies in the UK, and a [Road Miles Lottery](#).

[Road Miles](#) will be fun!

Companies bidding in the Auction would pass the Road Miles on to customers in a variety of ways, such as customer loyalty plans or via direct marketing campaigns with Road Miles as a bonus for purchasing products.

The [Road Miles Lottery](#) will be run along similar lines to the National Lottery, providing funding for road maintenance, potholes and road projects, and local bus support, whilst giving players the chance to win hybrid/electric Porsches and Teslas as well as free [Road Miles](#).

[Road Miles](#) is radical approach which our research shows will be accepted by the public and hence not become a 'poll tax on wheels'.

Results of a recent Populus Survey<sup>2</sup> in January 2017 of more than 9,000 drivers show support for the concept. Populus posed the question:

<sup>1</sup> And, with future in-road wireless technology, by road type and time of day

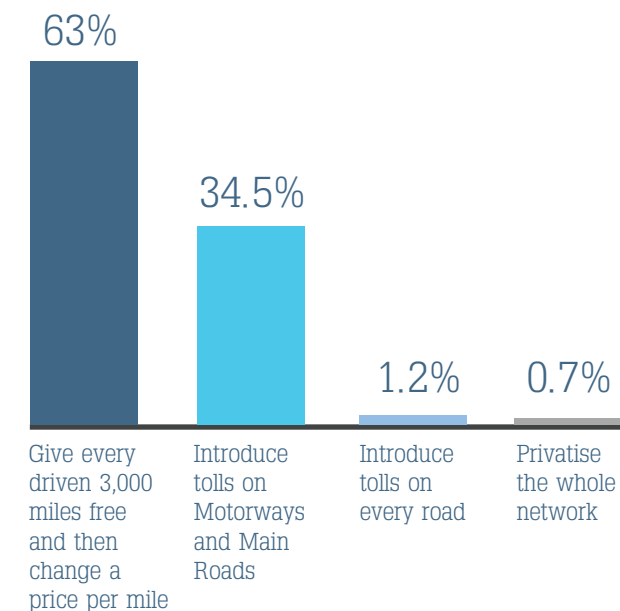
<sup>2</sup> Prepared on behalf of the AA

“Drivers pay motoring taxes that go towards road investment through fuel duty, VAT on fuel and car tax (VED). As we get more hybrid and electric cars on the roads this tax take will diminish considerably. Which if any of the following do you think would be the best way to pay for roads in the future if fuel duty is abolished?”

Of those drivers who selected an option linked to miles driven, nearly to-thirds (63.5%) supported the Road Miles option, and there were almost uniform levels of support across regions, age, and sex.

### Populus Survey - Paying For Roads

Which of the following do you think would be the best way to pay for roads in the future if fuel duty is abolished?





### 3. Current UK road expenditure and financing

Latest figures show that £9.6 billion was spent on roads in Great Britain in 2015/16, representing 1.2% of total public expenditure in Great Britain.

The present way of financing this road expenditure is through general taxation receipts.

Specific taxes paid by motorists – Vehicle Excise Duty, Fuel Duty and VAT on Fuel – account for £39 billion annually, representing a significant 5.8% of total UK tax receipt

### 4. Revised vehicle excise duty (VED)

Our proposal includes Vehicle Excise Duty as every vehicle is legally required to be registered and should pay to access the road network.

In these respects, VED works in achieving both objectives.

Total VED revenue in 2015/16 was £6 billion.

From 1 April 2017, there will be big changes to how cars are taxed<sup>3</sup>. The main points are:

- The first year rate will be based on official CO2 figures.
- A flat standard rate of £140 will apply to all cars except those releasing 0 grams CO2/km for which the standard rate will be £0.
- An extra charge of £310 a year will apply to cars with a list price over £40,000 in the first 5 ‘standard rate years’.
- Cars first registered before 1 April 2017 will continue to pay car tax under the old system.

However, in terms of encouraging motorists towards a quicker uptake of greener vehicles, we believe that there should be further modification to take into account other more detrimental emissions such as nitrogen oxides (NOx).

Next Green Car (NCR), for example, has developed one method that could address this by creating a NCR Rating system that expresses a vehicle’s environmental impact as a score ranging from 0 to 100

(greenest to most polluting).

The methodology includes a comparison of the life cycle direct and indirect emissions generated for each vehicle, which include carbon monoxide, nitrogen oxides, hydrocarbons, particulates, and sulphur dioxide, along with the three main greenhouse gases associated with road transport, carbon dioxide, methane and nitrous oxide. So, for example, a VW Passat Saloon 2.0 TDI GT 150PS BMT – Euro 6 Diesel – 2015 has a NGC Rating of 36.6, compared with a Nissan LEAF Acenta – Battery Electric of 27.2.

We propose designing a VED system that generates the same tax take as the current system but gives graduated incentives for choosing greener, cleaner cars using the NCR rating system.

<sup>3</sup> Appendix: Government’s VED rate card

## 5. Fuel duty revenue and future decline

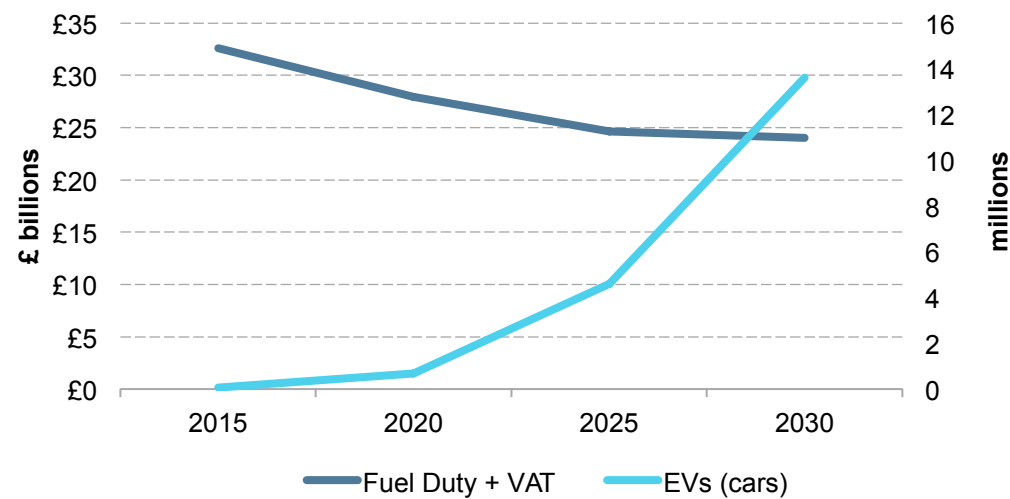
Fuel duty per litre of petrol, diesel and biofuel is 57.95 pence, plus 20% VAT, which is charged on the duty-inclusive price of fuel, taking the total cost per litre to 79.2 pence.

Total fuel duty plus VAT taxation receipts in 2015 was £32.6 billion, and accounts for 84% of total motoring tax revenue.

Technological advances – effect on traditional motoring taxation revenue streams

Government revenue from VED and duty will decrease as fewer vehicles use petrol or diesel.

Forecast growth of electric vehicle cars (m) and fall in fuel duty revenues (£bn)



Sources: Report for Committee on Climate Change, Aberdeen University 2013; SMMT Information Paper September 2014; OBR December 2016; Our Model

In addition to developing a fair means of paying for roads, our [Road Miles](#) proposal will bring in revenue levels which are comparable or in excess of those that the Government currently receives from motorists to compensate for this inevitable future decline in petrol and diesel receipts.

## 6. A new way to pay for better, safer, more reliable roads in a way that is fair to road users and good for the economy and the environment

**ROAD MILES** There are three central tenets to our proposal.

- ① A simple new system for drivers to pay for roads.
- ② An Auction of [Road Miles](#) to private companies plus naming rights
- ③ A [Road Miles Lottery](#)

### 1 A simple new system for drivers to pay for roads

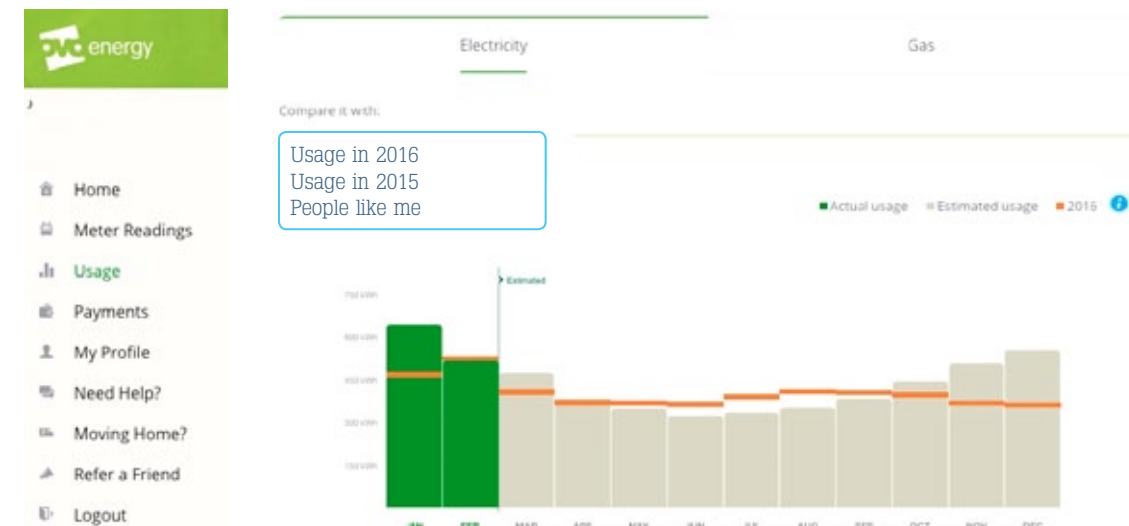
i) Each road user would be allocated a certain amount of Free Road Miles per annum depending on type of vehicle and the registered vehicle's address, giving them some free access to the road network. Once the free allocation limit has been reached, vehicle owners would be charged a modest mileage rate.

ii) Motorists would have their total

mileage recorded bi-annually at registered garages, and payment taken for the amount of Road Miles driven, net of free Road Miles. All the information would be recorded at their vehicle's MoT or service and held on a national database.

Alternatively, this could be done online or via an app, similar to gas and electricity supplier customers. OVO Energy customers can read their meters, input data and make payments online. In this way, the utility company needs only to make one household visit per annum for verification.

There are charts so customers can see how much energy they are using. This provides the opportunity for households to assess and adapt their behaviour to reduce energy usage and thereby their energy costs.



Adopting a similar approach would be a useful way for motorists to manage their mileage and payments.

This would influence motorists' use of their vehicles, as they would be able to see monthly mileage along with costs. Consequently, we would expect some modal shift to walking, cycling or public transport and greener vehicles.

Verification of total mileage travelled could be twice a year at garages undertaking the vehicle MOTs or major service for newer cars.

Our Road Miles concept will transform over time. In the future, as roads become more technically advanced with developments such as induction pads,

along with advanced vehicle recognition, payments could be taken automatically and electronically from the motorist's registered credit card as they travel along our roads.

Algorithms would be configured to register the road network mileage and payments for each vehicle onto the motorists' Road Miles account.

The bi-annual checks at garages would act as cross-verification.

Highways England's feasibility study of wireless in-road charging of electric vehicles will progress to trials over the next year to test the safety and effectiveness of this dynamic charging technology.

Fraud would be countered as new legislation is due to be introduced in 2018 banning companies that adjust milometers and each car's mileage would be added to the HPI National Mileage Register which would become the National Road Miles Register. <https://hpicheck.com/blog/eu-gets-backing-from-uk-dealers-to-outlaw-mileage-correction-firms/>

Police cars fitted with automatic number plate recognition (ANPR) systems would target evaders.

### Fairness

As a means to promote fairness to all road users, the number of free miles allocated to each motorist would be determined by postcode. Those living in the most remote rural areas would have a greater "free mile" allowance than those in urban areas. Seventeen of the UK's most rural areas with the highest fuel prices would qualify for extra free Road Miles. <https://www.gov.uk/government/news/rural-fuel-price-cut-gets-green-light>

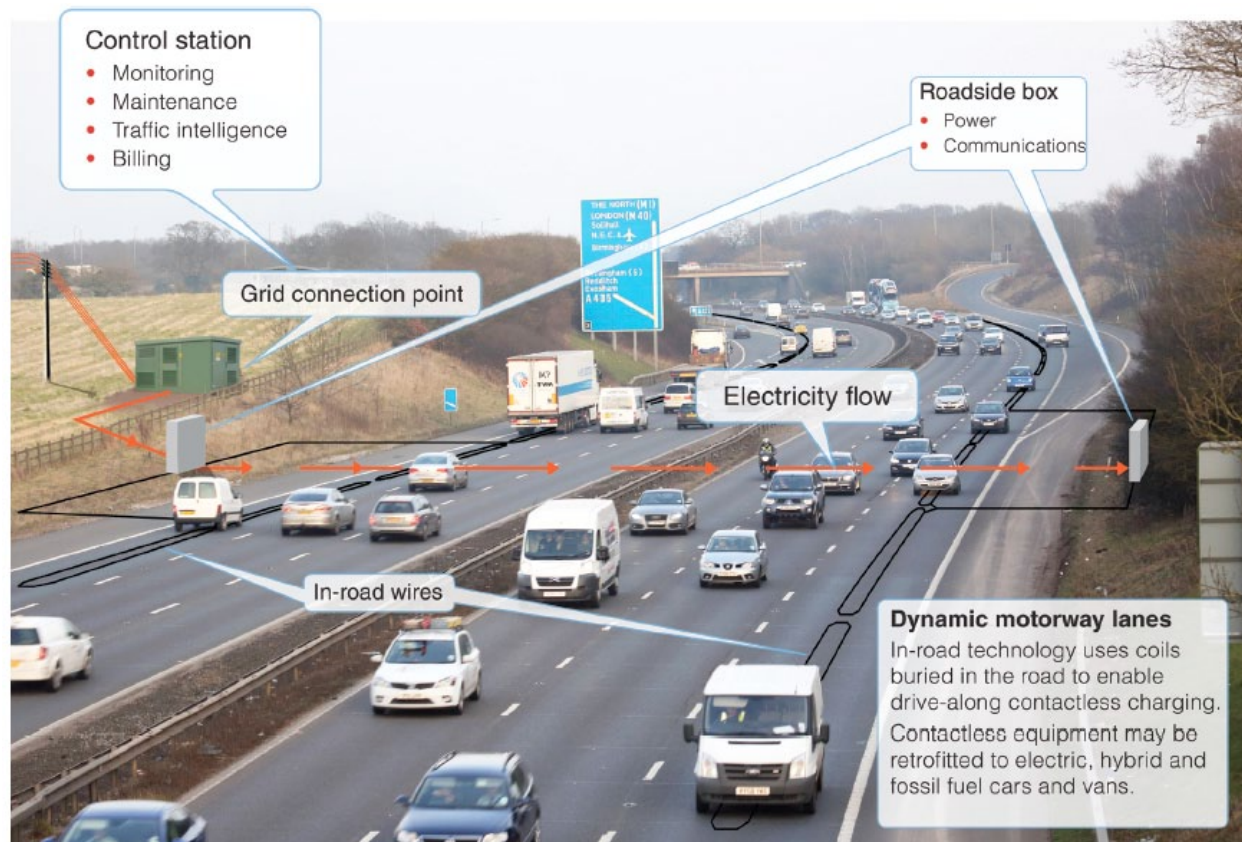
### Vehicle Rentals

Vehicle rental companies would incorporate road mile charges into their customer rental agreements, and record their customers' mileage on return of the vehicle.

This mileage would then be registered and charged to the rental companies.

### Overseas/ Tourist Vehicles

People on business, or tourists, bringing vehicles to the UK would pay for a permit – per day, week, or month – to cover their road mileage costs.





## 2 An Auction of “Road Miles” to private companies, plus naming rights

Additional Road Miles would be auctioned off so that private companies can offer Road Miles with their products or services to customers.

For example:

- Ford may wish to offer 1,000 free miles with every new Ford Focus;
- MaaS (Mobility as a Service) providers may wish to build free miles into their car hire or car share propositions;
- Sky, BT, mobile phone operators and banks may wish to bundle Road Miles in with their Prestige Accounts;

Other examples are in the Appendix.

Revenue from the annual auction would help keep the cost per mile to motorists at acceptable levels. There is a precedent here with the 4G mobile Government auctions. <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2013/winners-of-the-4g-mobile-auction>

### Road Miles Adopt-a-Highway:

Road Miles will consider auctioning off the naming rights of key motorways in the way that football grounds have (Arsenal Emirates Stadium).

We might see:

A1 Adidas

M1 Morrison’s

M3 3M manufacturing company

M4 Microsoft

M6 Manchester Utd

These companies would also be permitted to exhibit at Motorway Service Areas, for example, Adidas Astroturf.

On local roads we would also consider US/Canada style Adopt-a-Highway schemes whereby local companies help pay for litter collection on these highways.

The Chancellor could ration the number of free miles for auction to a pre-determined limit to counter the risk of oversupply and congestion.

## 3 Road Miles Lottery

We envisage this being operated in a similar way to the successful National Lottery, set up by the Government and regulated by the National Lottery Commission.

Since the National Lottery was launched in 1994, £55 billion has been paid out in prizes. On average £30 million is raised per week for National Lottery projects and a total of £36 billion has been spread across 500,000 projects. This equates to around 160 projects for every UK neighbourhood<sup>4</sup>.

The percentage split of the £7,595 million annual National Lottery proceeds for the year ending 31<sup>st</sup> March 2016 was:

- 55% paid to players in prizes
- 25% raised for “good cause” National Lottery projects
- 12% went to the Government in Lottery Duty
- 4% earned by retailers in commission
- 4% to Camelot as the lottery operator

The “good causes” element of Road Mile Lottery proceeds would be for road maintenance, potholes and road projects, thereby ensuring a reliable and sustainable source of funding towards maintaining our roads to a good standard.

In addition, there has been a decrease in supported mileage for public buses since 2009/10<sup>5</sup>, currently 1.25 billion bus service miles, and so there would be scope to allocate some lottery funding towards local bus support to assist in the delivery of the social benefits identified by Greener Journeys<sup>6</sup> in conjunction with LowCVP.

Lottery prizes will be super state of the art

cars with free road Miles for one or more years. The very latest top end electric/hybrid models, such as Tesla S Model and proposed Aston Martin EV, would be offered to increase excitement about EVs. Service areas would showcase the cars with “Win Me for £1.50” signs. Smaller cash prizes would also be allocated.

We believe the total lottery market will expand because new lottery players would enter the market whilst players of both lotteries would enjoy their increased chances of winning different prizes.

The Road Miles Lottery percentage split would be:

- 25% prizes
- 25% towards cost per mile reduction for car owners
- 25% for road maintenance and projects
- 12% Government Lottery Duty
- 5% Local bus support
- 8% Operating Expenses

<sup>4</sup> [www.national-lottery.co.uk](http://www.national-lottery.co.uk)

<sup>5</sup> Annual Bus Statistics: England 2015/16 – DfT, October 2016

<sup>6</sup> <http://www.greenerjourneys.com/>

## 7. Road Miles Model

Road Miles will deliver the main revenue stream as Fuel Duty revenues decline.

Proceeds from the Road Mile Lottery and from the auctioning of Road Miles will supplement Road Mile revenues and the necessary funds for road maintenance and other road projects, and with some proceeds allocated to local bus services.

These revenue streams grow over time with the price per mile increasing whilst fuel duty proceeds decrease due to:

- a. A decline in the number of petrol and diesel vehicles as the number of alternative fuel vehicles grows;
- b. A continuing improvement in vehicle fuel efficiency; and,
- c. A decline in the rate of fuel duty, frozen at Year 5. Whilst a decline in the duty rate will be of benefit to petrol and diesel vehicle owners, it nevertheless remains an additional cost compared to motorists driving alternative fuel vehicles. Therefore, the over-riding impetus will be towards a faster uptake of greener vehicles. The freeze in Year 5 is to coincide with the average vehicle replacement cycle.

With a view to maintaining Government motoring taxation revenue at or above current levels, and at the same time creating a fair system for motorists, the cost per vehicle road mile will change along with the rate of fuel duty.

The main drivers of the [Road Miles](#) cost per mile are:

- ① The annual amount of “free road

- ② miles” allocated to each road user, and
- ② The percentage decreases in the rate of fuel duty.

### Assumptions

- a. An allocation of 3,000 Free Road Miles per year per motorist (cars below 100g CO2 would qualify for additional miles, as would rural inhabitants).
- b. The total numbers of vehicles by type are held constant at 2015 levels. Whilst the Department of Transport forecast vehicle numbers increasing 25% by 2040, others comment that car traffic has been flat-lining and predict some decline in traffic in line with the “peak car” hypothesis that motor vehicle distance travelled per capita has peaked and will now fall in a sustained manner.

UK population growth in the 2020s decade, this is projected to grow at an average 0.58% pa<sup>7</sup>

<sup>7</sup> ONS: Overview of the UK population: February 2016

- c. There is an increase in the number of Alternative Fuel Vehicles (AFVs) from the current 310,000 to 1.3m by Year 10. This assumes growth in the share of total cars registered from the current 1% to 4.5% by Year 10, and that there is a corresponding decrease in the number of petrol/diesel vehicles. The increase in AFVs means that they would account for 50% of all new UK car sales by Year 10, which is in line with Go Ultra Low’s forecasts for the year 2027. The same percentage shares have been used for the other vehicle categories.

- d. The fuel duty rate, as one of the drivers in our model, falls from today’s 58p per litre of fuel to 47p by Year 5. Our proposal incorporates this reduction as a means of offsetting the new cost of motoring to vehicle owners when the new [Road Miles](#) system goes live.

#### The effect of fuel duty rate changes on pump prices

The road user will welcome any reduction in pump prices. In our model, the fuel wholesale price and the VAT (charged at a percentage of the wholesale price plus the duty) remain constant at 42p per litre and 20% respectively. Petrol pump prices would fall by 17% from today’s price of 121p per litre to 106p by Year 5, and diesel from 123.5p to 108.5p. The reduction is planned to be fair to motorists, and to keep businesses competitive by not

increasing their transport costs during the initial transition years of Road Miles when most motorists will be paying both Road Mile costs and fuel duty. HGV traffic has yet to return to pre-recession levels<sup>8</sup>

Pence per litre	Today	Year 1	Year 5
Fuel Duty	58	52	47
Pump price – petrol	121.0	112.3	106.3
Pump price - diesel	123.5	114.6	108.5

From Year 5, fuel duty is frozen on the basis that the average motorist will change their car once every five years. This ties in with our projection that around a fifth (22%) of all new car sales will be alternative fuel vehicles (AFVs) in Year 5, based on Go Ultra Low’s ten-year forecast.

The London Mayor’s proposed scrappage scheme, which Road Miles will fully endorse, together with strong incentives from the Road Miles scheme (those with an AFV will not pay fuel duty) will encourage a faster take up of greener vehicles.

- e. An auction of 30 billion Free [Road Miles](#) pa to companies, which is the equivalent of 9% of current total vehicle miles travelled.

<sup>8</sup> FT: Road Use Statistics Great Britain, 7th April 2016



We assume that 50 major companies from different industry sectors – financial, breakdown, car manufacturers, utilities, supermarkets, media and social media, phone companies, high street retailers, food companies – would bid an average 5% of their annual advertising spend on purchasing Road Miles to pass on to their customers.

Conservatively, we have assumed that a further 200 of the 7,000 large companies in the UK would want to join the auction, bidding an average 0.4% of average annual turnover.

f. The difference between annual Road Mile model revenues and current fuel duty plus VAT receipts will be zero or show a small surplus.

Fundamentally, this ensures that there is no loss compared to current Government motoring taxation revenue streams.

g. The Road Miles lottery fund is forecast to raise £674 million in Year 1 – equivalent to 14% of National Lottery ticket first year sales, based on the assumption that 55% of car owners buy tickets every other week at £1.50 per ticket. Lottery takings are predicted to grow incrementally over the forecast ten-year period to £2.79 billion, which is equal to 48% of current National Lottery revenues.

We assume that 25% of earnings will be allocated to road maintenance and other road projects, 25% towards costs per Road Mile, and 25% for prizes and 5% towards financial support for local bus services.

## Projections<sup>9</sup>

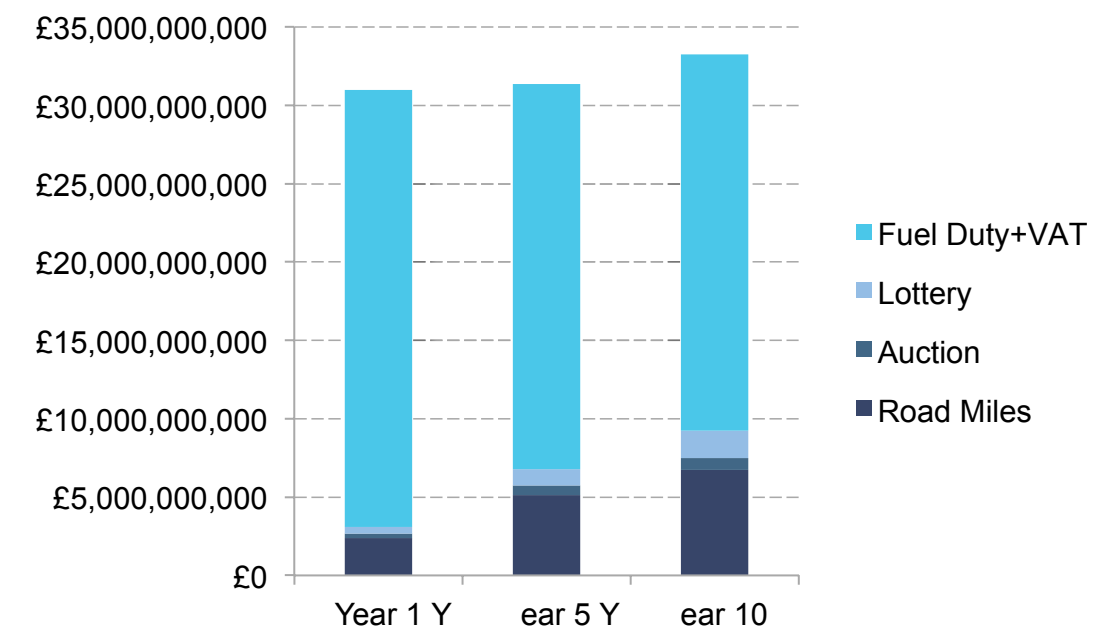
We undertook extensive business modelling of our Road Miles scheme, looking carefully at today's breakdown of costs, revenues and vehicle figures, sourced from the Treasury and DfT, before creating our detailed financial model. Many scenario tests were performed in deriving our base level projections, which are based on conservative assumptions.

### a) Government revenues

Total revenue will come from four sources (until the time when fuel duty is no longer applicable) and will be maintained at or above current fuel duty (plus VAT) revenues:

- i. Road Miles revenue (from cost per mile by vehicle)
- ii. Road Miles Lottery revenue
- iii. Road Miles Auction revenue, and Road Miles naming rights revenue
- iv. Fuel Duty + VAT

The share of proceeds from the three Road Mile revenue streams triples from 11% to 30% over the ten-year period, whilst the fuel duty revenue share correspondingly falls from 89% to 70%.

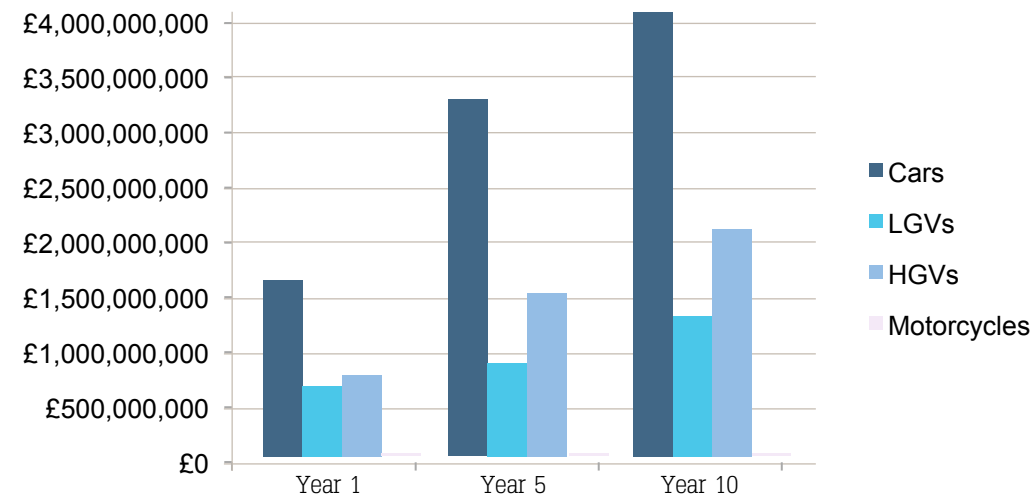


The share of revenues from Road Miles could grow more rapidly over the ten year forecast period if the take up of AFVs accelerated at a greater rate than forecast because, for example, dynamic charging comes on stream earlier than currently predicted.

<sup>9</sup> Further detail in Appendix

**i. Road Mile revenue**

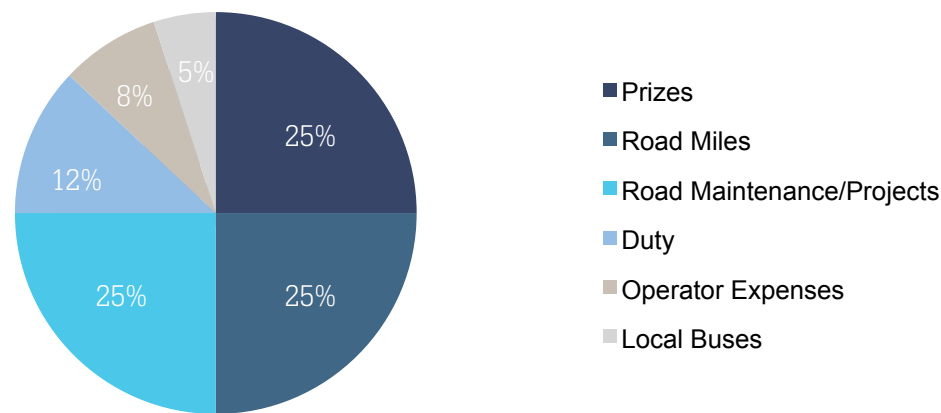
Road Mile revenue increases from £2.4 billion in Year 1 to £6.7 billion by the end of the forecast period, with cars accounting for 58%, LGVs 17%, HGVs 25% and motorcycles 0.2%.



**ii. Road Mile Lottery revenue**

Total Lottery proceeds are forecast to grow from £674 million in Year 1 to £2.8 billion in Year 10.

**Lottery Fund Proportional Split**



This proportional split would benefit motorists in many ways. For example, there would be an average £458 million pa towards road maintenance, potholes and other road projects. Last year, two million potholes were filled at a cost to the taxpayer of £118 million. Research by Kwik Fit (the car parts and servicing firm) found that 6.3 million drivers suffered damage from hitting potholes in the year 2015/6 and paid an average £108.60 for repairs to tyres, wheels, suspension and exhausts, giving them a total repair bill of £684 million.

**iii. Road Mile Auction revenues**

We assume that bidding companies' pay the same price per Road Mile as car road users in our model but, in reality, Road Miles up for auction will be capped and therefore the Road Mile price could be higher.

Year 1	£300 million
Year 5	£600million
Year 10	£750 million

Any increase in the price per mile would augment this revenue source further.

Additional revenue (not modelled) will come from auctioning of Road Miles naming rights of key motorways ("Adopt a Highway, page 17). This could add a further £200 million revenue with ten £20 million deals pa.

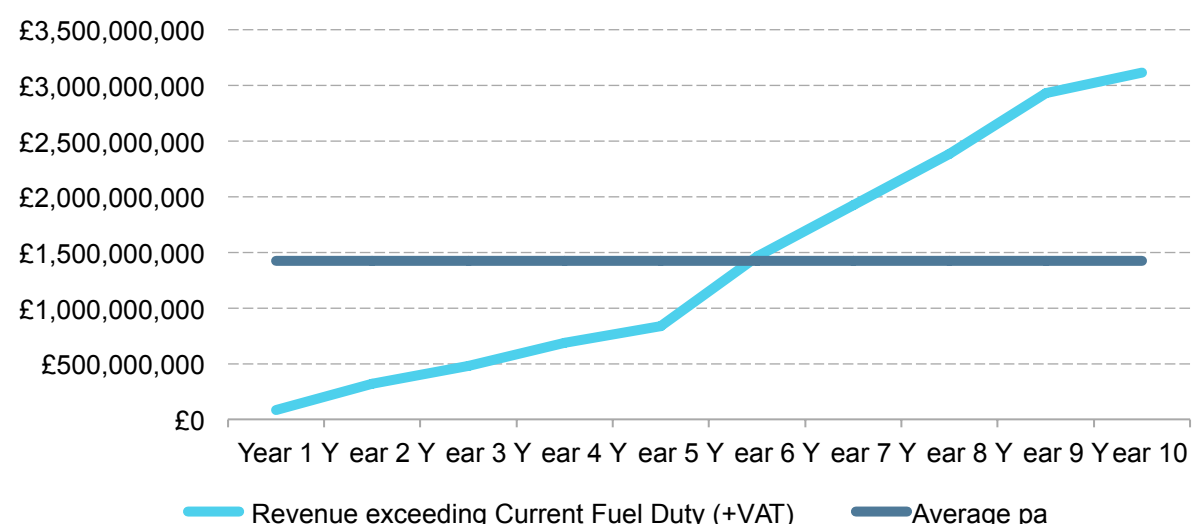
**iv. Fuel duty plus VAT on fuel revenues**

The fourth source of Government revenue from motorists, fuel duty, plus VAT on fuel, is projected to fall from £33 billion in 2015 (100% of total revenue) to £24.6 billion (77%) when the rate of duty is frozen in Year 5, and £24 billion (70%) in Year 10.

## b) "Surplus" Road Miles Government revenue

Whilst developing [Road Miles](#) as a means of paying for better, safer, more reliable roads in a way that is fair to road users and good for the economy and the environment, we incorporated the objective of maintaining total Road Mile revenues at least equal to the Government's fuel duty (plus VAT) revenues for the vehicle categories modelled - cars, LGVs, HGVs & motorcycles.

In Year 1, total revenue exceeds current duty revenue by £60 million and by £3,113 million in Year 10, giving annual average 4.4% "surplus" revenues of £1,421 million per annum across the ten years.



## c) Motorist Road Mile costs

Road Mile costs have been calculated as a [Road Mile](#) cost per mile plus fuel cost per mile. Since an average vehicle replacement cycle is five years, fuel duty will be cut over these initial years so that the total cost for motorists is not increased above today's level. The purpose is to ensure that there is benefit to all road users with the introduction of the new Road Miles system, but that after five years it becomes more advantageous to switch to alternative fuel vehicles.

Owners of alternative fuel vehicles will

pay only the Road Mile cost whilst petrol/diesel vehicle owners will pay the combination of Road Mile cost plus fuel costs, and commercial revenues will be used to help keep the cost per mile to motorists at acceptable levels.

For example, the cost per mile for petrol/diesel cars will be 4% - 6% lower each year to Year 5 compared with the current rate of 11.99p. From Year 5 onwards, fuel duty is held constant, and the cost per mile will rise so that it is more expensive to run a petrol/diesel vehicle than it is today, giving added impetus to switch to greener models.

### Per mile driving costs by vehicle type - in pence

Pence per litre	Today	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
<b>Road Mile Cost</b>							
Car	0.00	0.95	1.05	1.30	1.51	2.00	2.50
LGV	0.00	1.02	1.15	1.40	1.70	2.20	3.13
HGV	0.00	3.45	4.00	4.80	6.00	7.80	11.00
Motorcycle	0.00	0.00	0.00	0.00	0.00	0.30	0.80
<b>Fuel Cost</b>							
Car	11.99	10.54 13.10	10.28	10.01	9.77	9.54	9.71
LGV	14.12	41.45	13.02	12.86	12.70	12.40	12.40
HGV	44.9	6.68	41.19	40.68 6.55	40.17	39.24	39.24
Motorcycle	7.20		6.64		6.47	6.32	6.32
<b>Total: Road Mile + Fuel Cost Car</b>							
LGV	11.99	11.49	11.33	11.31	11.28	11.54	12.21
HGV	14.12	14.12	14.17	14.26	14.40	14.60	15.53
Motorcycle	44.93	44.90	45.19	45.48	46.17	47.04	50.24
	7.20	6.68	6.64	6.55	6.47	6.62	7.12
<b>% Change from Today's Cost Car</b>							
LGV		(4.21%)	(5.52%)	(5.72%)	(5.96%)	(3.79%)	1.82%
HGV		0.00%	0.37%	1.00%	1.97%	3.44%	10.03%
Motorcycle		0.08%	0.58%	1.21%	2.74%	4.69%	11.81%
		7.20%	(7.77%)	(8.92%)	(10.07%)	(7.97%)	(1.02%)

The low [Road Mile](#) charges would be welcomed by drivers and have a positive effect on household disposable income. In turn, this would benefit the local and national economy with households being able to maintain or increase expenditure on other goods and services.

The [Road Miles](#) cost for [motorcyclists](#) will be zero from Year 1 to Year 5, ensuring

that the total cost per mile will be less than today. Thereafter, the cost per mile will increase in the same way as for other vehicles.

[LGV and HGV](#) total average costs per mile will remain around today's rate over the first few years so as to discourage goods and freight transfer from other modes of transport onto our roads.

## 8. A fairer way of paying for roads

### What we pay for roads

UK drivers pay almost four times as much in motoring taxes as is spent on roads which is the highest ratio in Europe<sup>10</sup> (with the exception of Malta).

In addition to covering the costs of roads, the taxes and charges are reinvested in society at large and could also be used to tackle the social costs of road transport.

As the European Commission considers enabling additional charges to fund infrastructure and manage road use, there have been calls for a re-examination of the revenue that is already generated before road users are burdened with new or increased charges on their daily mobility.

For the last half-century economists have argued that the solution is road pricing or pay-as-you-go pricing.

The UK Ministry of Transport published the first serious report entitled 'Road Pricing: The Economic and Technical Possibilities' in 1964. This became known as the Smeed Report, named after the Chair of the Report. It detailed seventeen requirements for a road pricing system including privacy, ability to charge different amounts for different roads and times etc. Most of the requirements are as relevant today as they were then.

Such schemes came to the fore every ten years or so but every time road pricing was deemed to be at least ten years away. It still is: -

"People say that national road pricing is ten years away - and it always will be - unless we examine the options and decide what we want. Once we've decided, we can get on with doing it"

Transport Secretary 2005: Alastair Darling  
[http://news.bbc.co.uk/1/hi/uk\\_politics/4077336.stm](http://news.bbc.co.uk/1/hi/uk_politics/4077336.stm)

Blunt road pricing schemes have always fallen down in the UK as a "poll taxes on wheels." In response to a question posed by the Select Committee on Transport, November 2002:

Examination of witnesses (Question 494):

".....The reason I ask is that in your charter you ask for some of the costs to be offset?"

"(Mr King): The reason for that - and I think that it is a very good political reason - is that no political party, no Government, will go out there and sell congestion charging to the public without giving something back. It would be another poll tax on wheels. So I think you have to look at the practicalities of selling it to the public and I think that an offset of fuel duty, not entirely equivalent to the charges, would certainly help those poorer motorists in rural areas who have no alternative."

The AA President: Edmund King  
<http://www.publications.parliament.uk/pa/cm200203/cmselect/cmtran/38/2112710.htm>

In 2007, an online petition against road pricing attracted over 1.8 million signatures.

"Drivers accept the principle of pay as you go but don't trust the politicians to deliver a fair system. So we need a radical new system of paying for roads that is fair but also clearly shows the benefits for road users. People are happier to pay for things (and pay more) if they get a good service."

The AA President: Edmund King  
<http://www.publications.parliament.uk/pa/cm200203/cmselect/cmtran/38/2112710.htm>

The current way we pay for roads via fuel duty will become redundant as we switch from fossil fuels to electric or hydrogen powered vehicles. Vehicle Excise Duty would also have to be radically redesigned to keep up with the changes, as we have suggested on page 11.

Fuel duty tax is generally deemed unfair because it is regressive in the sense that all road users - rich or poor, employed or unemployed, younger or older - have to pay the duty regardless, and each pound paid out represents a larger proportion of a poorer household's income than of a richer household.

General taxation is considered still more regressive because everyone pays whether they use the roads or not.

But, Road Miles will offer a fairer way of paying for roads because:

- Every vehicle will be given a free allocation of Road Miles. Our proposal suggests an average 3,000 per vehicle – that is nearly 40% of the average number of current miles travelled per car. These allocations will benefit all road users and, in particular, will favour those who travel less, such as students, the disabled, the unemployed and the elderly.
- Rural inhabitants will receive a greater allocation of free miles to reflect their location and the longer distances they need to travel for shopping, hospital visits and so on, compared with their urban counterparts.
- Fuel duty will be cut by 20% over the first five years and then kept constant at 47p per litre until it is phased out. The new Road Miles fuel costs for all vehicles compare favourably to today's cost per mile. For example, figures from the Department of Transport indicate that the average petrol car travels around 45 miles per gallon. With the cost of petrol currently £1.21 per litre, this equates to 11.99p per mile driven in fuel costs compared with 10.54 pence in Year 1 falling to 9.54p by Year 5 (table above on page 25).

<sup>10</sup> Table of cost cover ratios in Appendix



## 9. Good for economy and good for the environment

### a) Lower transport costs

Sustained lower Road Mile costs will be good for the economy – both local and national because they translate into lower transport costs.

Local tradespeople – plumbers, electricians, roofers, builders, florists – will benefit as will the national supermarkets, high street retailers and hauliers.



### b) Tackling congestion and road efficiency

A fall in the cost of congestion, estimated<sup>11</sup> to be £32 billion pa (i.e. nearly £1,000 per driver) would benefit the economy. A more efficient road network will support economic activity, make deliveries more reliable and decrease journey times.

A less congested network will improve air quality, which is a serious issue in London and major urban areas.

Britain's roads are becoming increasingly congested. There were 320.5 billion vehicle miles travelled in 2016, up 1.2%

on the previous year, according to Department for Transport (DfT) figures.

This is the most ever recorded, and is 2% more than the pre-recession peak in the year ending September 2007. Traffic on motorways and rural A roads increased to new record levels last year, rising by 2.1% and 2.5% respectively.

Van traffic saw the biggest growth last year at 3.4%, with heavy goods vehicles up 2.8% and cars up 0.7%. Rolling annual motor vehicle traffic has now increased each quarter in succession for more than three years. The boom in Internet shopping has contributed to the rise.

<sup>11</sup> Study by traffic information company, Inrix – 19th February 2017

A DfT spokeswoman said: “ We are taking the big decisions for Britain's future by investing a record £23 billion to get traffic moving and reduce delays.

“Transport doesn't just help people get around, it helps them get on. Roads open up opportunities and vehicles have clocked up a record number of miles in the last year, which is good news for British industry and our economy as a whole.”

Road Miles will help reduce congestion on the inter-urban roads and motorways because it is a subconscious form of rationing. Drivers who are close to their free Road Miles limit will consider whether some of their journeys are vital. Motorists' online Road Mile accounts with the graphics capability will reinforce this behaviour.

It is in this respect that it is imperative the number of free Road Miles per annum allocated to motorists is guaranteed by the Government otherwise the public's trust will be lost, and our Road Miles system will be compromised.

We have suggested an allocation of 3,000 free Road Miles per motorist per annum, but the amount and charge could be varied according to vehicle type and time of day to help manage road usage and congestion, whilst simultaneously increasing the efficiency of Britain's current roads. For example, developing a two-tier system for HGVs where the cost per mile is cheaper between 9pm – 6am.

In the urban areas Road Miles alone will not address the congestion issues but should still reduce some demand. In our vision, the local transport authorities will still have scope to provide solutions such as Low Emission Zones, enhanced bus

and cycle routes, improved park & ride, Park & Share and Park & Cycle.

Free Road Miles for buses and authorised on-demand mini-buses will improve the attraction of public transport.



### c) Economic activity in depressed areas

There are unemployment hotspots in the major cities such as parts of London and Birmingham but also in some outlying areas where traditional industries such as ship building, steel or mining are no longer carried out.

For instance, Middlesbrough features in the top ten unemployment hotspots. Part of the Road Miles strategic plan would be to target road improvements in depressed areas where improved connectivity would enhance economic development.

One such example would be the recently completed A19/A174 Parkway Junction improvement, which helped improve access to the Teeside Industrial Estate.

In other areas we would look to unlocking brown field sites for economic development by improving the road connectivity and relaxing industrial planning permission around these road hubs.



Another current development where new road infrastructure is essential is around the proposed new Hinkley Point nuclear power station at Bridgewater. This development could bring 25,000 new job opportunities over ten years but not without improved accommodation and road access.

Hence in the way that Road Miles supports drivers in the most remote rural areas, it will also promote targeted improvements in key depressed areas.

#### d) Encourage faster take up of alternative fuel vehicles (AFVs)

A faster rate of uptake of AFVs will be good for the environment. The Government is considering a new scrappage scheme that will incentivise diesel drivers to switch to a low- emission replacement vehicle, along the lines of the extremely successful French scheme.

We fully support this proposal. Road Miles will compliment this initiative, encouraging a faster take up of greener vehicles because:

- The fuel duty element of the cost per mile will be eliminated;
- Cars with < 100g CO2 would qualify for more free miles; and
- A re-aligned VED rate card will favour greener vehicles

## 10. Safer, smarter roads: How can we improve the roads?

### a) Make them safer

Our aspiration should be for the safest roads in the world. We should embrace vision zero (Swedish vision for zero road deaths <http://www.visionzeroinitiative.com/0>)

We should make EuroRAP the stepping-stone to the safest roads in the way that EuroNCAP worked for car safety. Some of this has started with a fund created to improve the 50 most dangerous roads. [www.roadsafetyfoundation.org/eurorap-uk.aspx](http://www.roadsafetyfoundation.org/eurorap-uk.aspx)

Currently the motorway capacity in England is being increased by converting hard-shoulders into permanent or temporary running lanes on so-called 'smart' motorways. However, corners are being cut in terms of road safety with lay-bys or Emergency Refuge Areas (ERAs) only specified every 2.5kms (1.5 miles).

79% of drivers in a recent Populus poll claim this has made the motorways less safe. <http://www.newsandstar.co.uk/news/national/article/Smart-motorway-lay-bys-labelled-death-zones-by-unimpressed-drivers-de1e7ac2-a687-4a73-985b-7a89e23fb67c-ds>

The successful M42 pilot for 'smart motorways' had lay-bys every 600 – 800 metres but recently the goal posts have been changed to 1.5kms that potentially and psychologically puts drivers at risk. Road Miles would double the number and size of ERAs on smart motorways as demanded by the AA and RAC.

If we are to ask drivers to pay for roads in a different way, then the first thing we should do is ask drivers what they want. Drivers actually want safer roads. Even

if this is a perception we should listen to our customers and give them what they want.

### b) Make them smarter

#### i. Going underground:

The Road Miles philosophy is to provide more radical solutions to traffic congestion.

Whilst the UK has been a pioneer in providing adventurous rail tunnels (Channel Tunnel, Cross Rail etc), road tunnels have been the poor relation until recently. Currently there are proposals for a A303 Stonehenge tunnel (after 30 years of debate) and an idea for a [Trans-Pennine tunnel](#).

Paris has the futuristic [A86 west tunnel](#) that has transformed journey times.

The [Boston Central Artery/Tunnel project](#) is another example of using vision to transform the urban landscape.

Ideas for a network of London tunnels were developed in the 1980s by an Imperial College academic. More recently when Boris Johnson was mayor, an 18km tunnel was promoted to run from west to east linking the A40 at Park Royal to the A12 at Hackney Wick. A second 25km tunnel could be developed to the south from the A4 in Chiswick to the A13 in Beckton.

Such tunnels can reduce congestion and improve air quality.

Polling suggests that drivers would be willing to pay extra to use these tunnels as they can appreciate the time savings.

We believe that other cities such as Newcastle, Birmingham and Manchester could

## ii. Traffic management

### Road Investment Strategy

Road Miles will be the funding source for further developing the Roads Investment Strategy(RIS), which we support. RIS 1 was announced by the government in December 2014 and outlined a multi-year investment plan including over 100 major schemes funded by £15.2 billion of public money. RIS 2 is currently being developed. There are important schemes such as the Lower Thames Crossing and improved Northern Trans Pennines routes being taken forward. Road Miles funding will continue to support these vital projects.

We also want to see more innovation in the RIS schemes. A good example would be the Black Dam 'doughnut' roundabout near Basingstoke.

The Black Dam Roundabout is located at the northern end of the M3 Junction 6 Spur in Basingstoke, Hampshire. The roundabout was operating above capacity, resulting in long queues during weekday peak periods along all approach roads and even onto the M3 Junction 6 exit slip roads.

The doughnut style construction (sometimes also referred to as a 'half hamburger'), shown below, of a four lane northbound carriageway through the roundabout, widening on the eastern side of the gyratory to provide four lanes and widening on the north-eastern section of the gyratory to provide five lanes, has had incredible results in reducing peak time congestion.

The £11.24m investment has led to a vast improvement to all the traffic flows saving at least ten minutes per trip in peak periods and stopping the dangerous queuing of traffic coming off the M3.





### iii. Freight traffic

On current trends, it is not car traffic that is growing fastest but freight traffic is growing by record amounts. DFT figures show car traffic grew by 0.9% last year but HGV traffic grew by 3.4% and LGV van traffic by 3.8%. Hence it will be paramount to improve freight logistics.

With the demise of heavy industry most freight traffic is governed more by consumer demand than by industrial demand. Retail trends such as increased home shopping, faster deliveries, multiple free return policies, are increasing the number of white van trips. These trends are not sustainable.

Deliveries are a particular problem with multiple attempts to deliver a single package. During the London Olympics many companies banned their staff from receiving deliveries at work, which reduced congestion. Road Miles would consider setting up delivery and collection hubs whilst encouraging shared delivery points and experimentation with delivery drones.

Road Miles would also encourage more HGVs to travel longer distances on the strategic road network at nights by encouraging concessions for night-time platooning and reduced Road Miles costs governed via the tachograph.

### Overseas freight

The UK Brexit decision should potentially make it easier to impose charges and restrictions on overseas HGVs. Currently non-UK registered HGVs must make levy payments before entering the UK. The levy can be paid by day, week, month or year and discounts are available for longer levy periods. To boost the UK haulage industry, Road Miles will consider adding a mileage payment to the levy.

More lorry parks would be set up particularly around the ports and at motorway hubs to discourage the congestion chaos caused by Operation Stack when there are ferry or shuttle problems.

### iv. Motorway mile lanes and motorway miles cashback

Consideration would be given to developing High Occupancy Vehicle (HOV) lanes on key motorways that could be utilised by car-sharers, electric vehicles and ultimately by semi-autonomous cars and driverless cars. These would be through lanes without entry and exit at every junction to discourage local junction hoppers.



Road users will be entitled to compensation where things go wrong, for example, over-running roadworks or failure to clear highways in three hours. Automatic Number Plate Recognition (ANPR) cameras at the scene will track vehicles affected and automatically add free Road Miles.

### v. Road miles mover

Highways England Vehicles will be fitted with padded “bull bars” to quickly remove crashed vehicles from carriageways.

### c) Improve road maintenance

More dedicated ring-fenced funding will be allocated to address the maintenance backlog particularly on local roads, some of which would be funded by the Road Miles Lottery.

The Government has committed £6 billion for local road maintenance from 2015 to 2021 but the 2016 ALARM survey<sup>12</sup> estimates that £11.8 billion is needed by local authorities to bring all their roads up to scratch. Dedicated funding should eventually help to reduce compensation claims for pothole damage.

Tenders would be put out for a rapid response Pothole Assist service. The lane rental system and permit system to reduce disruption particularly from utility companies digging up the roads would be tightened and fines increased. On new roads more ducts would be utilised along the side of the road to counter disruption from road works. On existing roads technology to tunnel cables under roads, rather than digging up the roads, would be utilised.

Consideration would also be given to more widespread use of materials such as porous asphalt, which reduces surface noise and aquaplaning.

Other “smart surfaces” are being developed. Some of these innovations will take a decade or more to come to the market, but others are already on-stream. For example, quick-cooling bitumen products used in the UK and Europe allow for asphalt to be laid at lower temperatures than standard asphalt, enabling construction workers to repair roads and open them to traffic faster, while also reducing carbon dioxide emissions during the paving process.

Shell is exploring road technology that could potentially remove harmful substances like nitrogen dioxide or particulate matter like soot and smoke from the air.

“Ice fighting asphalt”, which continuously releases salt as cars drive over it, is being developed to help prevent accidents from black ice.

And, lanes that glow in the dark: In the Netherlands, the N329 highway is painted with photo luminescent paint that lights up each lane without using any electricity.

<sup>12</sup> Annual Local Authority Road Maintenance Survey 2016

## 11. The future

### Connected cars and driverless cars



Global auto industry players and companies such as Google, Apple and Uber, are working hard to make the vision of the connected car and autonomous vehicles a reality.

Connected and autonomous cars that communicate with each other, avoid collisions, regulate their speed, will be able to travel closer together at higher speeds and therefore reduce congestion.

In the UK, the Government announced last year that it will invest £20 million in eight driverless projects.

However, in a modelling exercise by Atkins for the DfT, the results were mixed and in some ways counter-intuitive. They argue that on motorways and trunk roads, journey times will not be reduced until 50-75% of the fleet is at least semi-autonomous. Benefits of 25% autonomous vehicles were considered “negligible”.

Whereas simulations show that delays could be reduced by a fifth in congested

urban areas with a quarter of the fleet being semi-autonomous. However, this doesn't mean that a world with fully autonomous cars will be less congested. There could be greater demand from disabled and elderly people who currently can't drive. Whilst potentially this change could bring extensive social benefits for these groups it won't solve the congestion issue.

Isabel Dedring, then Deputy Mayor for Transport, commented in February 2016:

“If you've got a traffic jam full of driverless cars, that is not better than a traffic jam full of drivers.”<sup>13</sup>

In another scenario the lack of urban parking spaces could mean that passengers vacate their driverless cars to go about their business but instruct their vehicle to continue circling the Westfield leisure centre without any occupants.

<sup>13</sup> <http://home.bt.com/news/uk-news/streets-of-london-could-become-test-track-for-googles-driverless-cars-11364038434947>



Most manufacturers are extremely cautious when Level IV full automation as outlined in the Atkins report will arrive. The CEO of Aston Martin told us recently it would not occur in his lifetime which one hopes will be at least another 25 years and probably longer. That is not to argue that many benefits will be derived from Level III partial to full automation particularly in the realm of road safety.

Others are more optimistic. Ford is to invest \$1bn over the next five years in a new driverless car unit with a goal of reaching a commercial autonomous fleet by 2021 which is much more ambitious than any other manufacturer.

So, whilst there may be some congestion benefits from automation, particularly in areas like HGV platooning, our analysis suggests we cannot depend on driverless vehicles to solve our congestion problems.

Hence, Road Miles will continue to enhance road infrastructure by removing pinch-points, smoothing flows and more tunneling, in addition to the self-limiting effect Road Miles will have on non-essential journeys, and potential to develop a two-tier time of day related system for HGVs.

## Driverless Insurance

The Department for Transport (DFT) recently announced proposals, which will require owners of autonomous vehicles to take up two-in-one insurance products.

Under the new rules, driverless car owners will need to have a single insurance policy for both the motorist when he or she is driving and for the vehicle when it is in self-driving mode. This differs from earlier proposals that required drivers to buy separate cover for

themselves and for the vehicle.

Claims made against cars in a collision while in self-driving mode will be paid out by insurance companies, which will then recover costs from the vehicle manufacturer or a third party responsible for the incident.

This single insurer model will ensure that in the event of a collision, the not-at-fault party will be properly compensated in the way that motor insurance works now. The new insurance framework for driverless cars would increase premiums in the short term but should come down at the tipping point when more cars become fully driverless. Human error is deemed to be a factor in 95% of crashes and some of those errors will be eliminated with autonomy.

## Urban Mobility

Non-traditional industry players are looking to offer “mobility” and make money using the free time of the driver.

Also, there is discussion about Fleets of Autonomous Vehicles that are Electric and Shared (FAVES)<sup>14</sup> with two emerging technologies:

1. The self-driving vehicle, guided by real time updates, and to the next customer by real-time passenger requests
2. Blockchain-enabled, secure, peer-to-peer transactions allowing owners to directly rent out their vehicles under their own terms and conditions.

Tesla has announced plans to allow owners to loan their cars to a shared autonomous fleet when not in use.

These are all different models to current ride-sharing services such as Uber.

Stefan Bratzel, Director of Centre of Automotive Management<sup>15</sup>, comments that “Ultimately, this will lead to a “battle of business models” between the OEMs and the new players in the next 15 years... and will be perhaps the most disruptive period in the industry’s history.”

Regarding this future state of flux, the way we pay for roads must be robust in order to adapt to an uncertain future. There are some indications that millennials are less enthusiastic about car ownership and are more likely to favour the sharing economy. However this is more of an urban trend but would not dilute the need for a comprehensive road infrastructure.

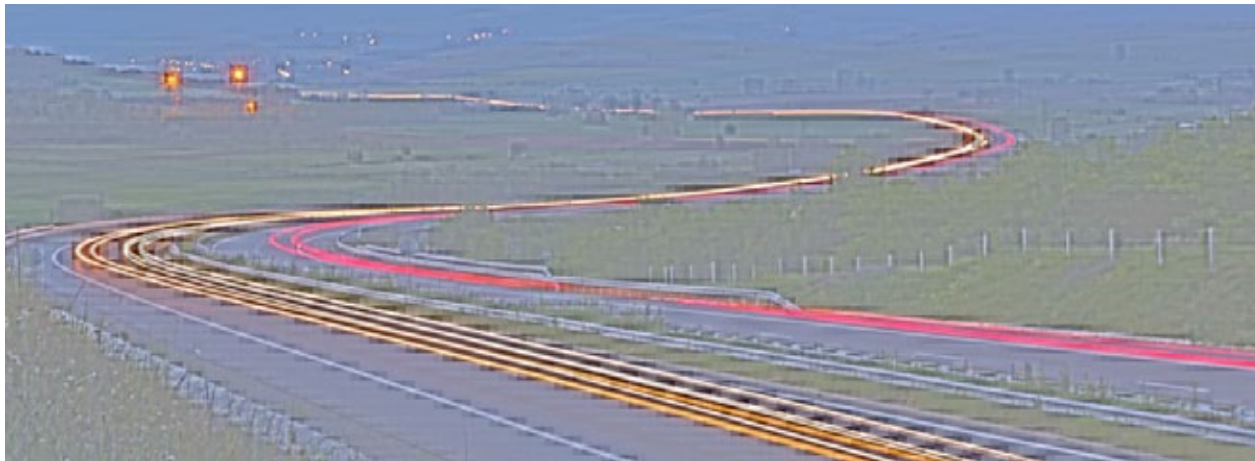
Road Miles has this capability because it will simply be the method of payment that will need to change over time – from paying online or at the garage in the first few years to payment via electric highway billing network to blockchain-enabled digital wallets when there is full-dynamic charging.

<sup>14</sup> <https://www.weforum.org/agenda/2016/12/goodbye-car-ownership-hello-clean-air-this-is-the-future-of-transport>

<sup>15</sup> University of Applied Science, Bergisch Gladbach, Germany



## Electric highways and solar highways



Several projects around the world are exploring how electric highways and solar highways could be developed to cater for greener vehicles and for new ways of using, producing, or storing energy that is good for the environment.

Wireless inductive charging will help popularise electric vehicles, but dynamic charging is very expensive with technology still in its infancy. There are other obstacles such as a lack of an industry wide standard for chargers.

At the moment, Highways England is trialing the feasibility of in-road charging and is committed to installing plug-in charging points every 20 miles on the motorway network. The Government supports the growing low emission vehicle market, as outlined in the DFT 'Action for roads' paper where it states: "An important part of managing the road network over the next thirty years will be preparing the infrastructure for a shift to these new types of vehicle' and will provide £500 million to support the growth of ultra low emission



Siemens, the engineering company, has unveiled its first project on German motorways with overhead electric cables that allow hybrid diesel electric freight trucks to switch to electric mode when they detect the cables.

The US start-up Solar Roadways is examining whether standard asphalt or concrete surfaces can be paved with panels fitted with photovoltaic cells that generate and store electricity.

Another example of how solar energy might be used was demonstrated by Daan Roosegaard, the Dutch artist known for imaginative projects fusing technology and energy, who set up a glowing lines project, painting three light-emitting lines along a highway in Oss, Netherlands, which absorbed light by day and glowed at night for up to eight hours.

<http://www.shell.com/inside-energy/the-roads-of-the-future.html>



Road Miles will endeavour to pilot these latest technological developments.

## 12. Road Miles Board and Panel

A Road Miles Marketing Board would be set up to promote the Road Miles scheme working alongside Highways England. As well as speeding up the road investment strategy it will look to introduce electric highways to encourage the faster take-up of electric and hybrid vehicles.

The Road Miles Director will head up the Board as a respected leader and representative of drivers. The appointment will be made from the private sector.

Companies that purchase a certain percentage of Road Miles will be entitled to sit on the Board and influence relief road investment in some key areas.

Our proposal includes setting up a drivers' panel, which would be consulted on a monthly basis.

This could be based on the AA Populus Panel, which is the largest dedicated motoring panel in Europe.

This could be based on the AA Populus Panel, which is the largest dedicated motoring panel in Europe. basis with returns of more than 20,000.

### Conclusion

One of the best definitions of politics is 'who gets what, when, where and how.' When politicians interfere with aspects of life deemed essential it can backfire. This is why 'Road Pricing' is still ten years away. It may be a great idea in economic terms but not in political or trust terms.

A Populus survey we commissioned in February 2017 of 20,000 drivers asked:

Motoring is currently paid for by a combination of fuel duty and car tax. Some have suggested however that we should move to a system of paying based on when, where and how far we travel. In principle, would you support or oppose such a system?

46% support 33% oppose 17% neither

We then asked:

If the government promised reductions in Fuel Duty and Car Tax on the introduction of road pricing, would you trust the government to deliver their promise?

11% Yes

75% No

15% Don't know

So despite drivers becoming slightly more supportive of road pricing over time, the massive obstacle is still total lack of trust for politicians to introduce a fair system.

### Road Miles is different.

The question posed in the 2017 Wolfson Economics Prize is one of great range and significance.

It is essential to find an answer to this question before vehicular technological advancement reaches a tipping point.

Supported by financial modelling, our [Road Miles](#) proposal offers a practical, sustainable and innovative solution that will win public support, and which will be able to transition road financing in a fairer way for those who pay for roads.

A significant benefit is that Road Miles is a simple, straightforward scheme that could be implemented within a short time frame.

In summary, every driver will be given at least 3000 free road miles. Fuel duty will be cut. After 3000 miles there will be a modest charge per Road Mile. Charging will initially be based on bi-annual mileage checks at MoTs or services. In the future mileage could be read on route. As fewer cars pay fuel duty, the Road Mile charge will be increased.



However, the extra income from the Road Miles Lottery, Auction and highway naming rights, will mean charges are kept lower than the equivalent of today's charges.

Road Miles will be popular. Two thirds of drivers support the concept.

Road Miles is not a political solution. It will be headed up by a Motorists' Champion and influenced by the Road Miles Drivers' panel.

Road Miles will save drivers money.

The Road Miles lottery, Adopt-a -Highway and Road Miles Auction will bring the concept to life in a fun way and reduce motoring taxation.

Drivers will get value for money. When things go wrong, drivers will be compensated with Free Road Miles.

Drivers will have more reliable journeys due to investment in more adventurous tunnelling and pinch point schemes.

Drivers will think more about whether their journey is really necessary when their Road Miles are running low.

Road Miles will help reduce congestion through improving the road network, encouraging more HGVs to travel at night and reducing the total number of journeys. Truck drivers will be provided with more lorry parks to ease congestion and give the drivers a better service.

Road Miles will be good for the environment by reducing congestion and through incentives encouraging the faster take up of greener, cleaner vehicles.

Road Miles will be safer as it will strive for Vision Zero. Smart Motorways will have more lay- bys to reduce the risk of

crashes and congestion in live lanes. The most dangerous roads in the EuroRAP road assessment programme will be improved as a priority.

Road Miles will help deprived areas by targeting road improvements in key unemployment hotspots and easing planning restrictions where jobs can be boosted.

Road Miles will encourage technological innovation with dedicated lanes for connected vehicles and semi-autonomous vehicles. Induction pads and fast charging stations for EVs will be developed.

Road Miles is simple. It is not rocket science. It is not a major IT project costing millions and then billions. It is neither pie in the sky nor spy in the sky. It is practical and does not compromise privacy.

It could be introduced within 12 months. Doing nothing is not an option. Doing Road Miles is the best option.

Please support Road Miles. The majority of drivers do.

**ROAD MILES: miles  
better, fairer, greener,  
safer**

## Appendix

### Auction of Road Miles to private companies, plus naming rights Other examples:

- The AA may wish to offer 500 free miles with a new membership;
- Autotrader or AA Cars may wish to provide 50 free Road Miles with every car purchased on their used car portals;
- Newspapers may wish to boost circulation with Free Road Mile offers;
- Credit card companies may wish to offer free Road Miles to new customers;
- Twitter, Google, Facebook may want to get involved;
- Radio stations could run competitions to win free Road Miles;
- Tyre companies could run promotional offers with for Road Miles.

### Government's VED Rate card from 1st April 2017

CO2 emissions	First year rate	Standard rate
0	£0	£0
1-50	£10	£140
51-75	£25	£140
76-90	£100	£140
91-100	£120	£140
101-110	£140	£140
110-130	£160	£140
131-150	£200	£140
151-170	£500	£140
171-190	£800	£140
191-225	£1200	£140
226-255	£1700	£140

## What we pay for roads

European Union Governments generated a surplus of €107.9 billion on road transport taxes in 2013. Road transport generated €286.3 billion in national taxes and charges, governments only re-invested a €178.4 billion into the road network.

### Cost Coverage Ratios for passenger cars 2013

UK	387%
Malta	558%
Luxembourg	378%
Bulgaria	368%
Belgium	246%
Germany	209%
France	186%
Ireland	287%
Netherlands	230%
Sweden	250%

## Road Miles financial projections

### Total Road Mile model revenues

All Vehicles (Cars, HGVs, LGVs, Motorcycles)	1. Petrol/Diesel Road Mile Revenue	2. AFV Road Mile Revenue	3. Company Auction Revenue	4. Total Lottery Revenue	Total Road Mile Revenue (1+2+3+4)	Fuel Duty Revenue	Total Revenue	Total Model Revenue less Current Fuel Duty Revenue = "Surplus" Revenue	% Surplus
Year 1	£2,359,574,247	£25,702,143	£300,000,000	£673,825,433	£3,359,101,823	£27,886,445,281	£31,245,547,103	£59,788,103	0.2%
Year 2	£2,639,585,871	£33,412,479	£315,000,000	£1,222,868,378	£4,210,866,728	£27,293,945,780	£31,504,812,508	£319,053,508	1.0%
Year 3	£3,226,906,304	£49,140,705	£420,000,000	£1,497,389,850	£5,193,436,859	£26,474,721,868	£31,668,158,727	£482,399,727	1.5%
Year 4	£3,830,193,533	£68,222,277	£525,000,000	£1,655,296,416	£6,078,712,226	£25,794,383,085	£31,873,095,311	£687,336,311	2.2%
Year 5	£5,025,020,168	£102,551,432	£600,000,000	£1,669,816,560	£7,397,388,160	£24,627,187,251	£32,024,575,411	£838,816,411	2.6%
Year 6	£5,496,439,845	£140,934,355	£660,000,000	£1,851,318,360	£8,148,692,560	£24,504,051,314	£32,652,743,874	£1,466,984,874	4.5%
Year 7	£5,795,631,563	£179,246,337	£690,000,000	£2,066,700,496	£8,731,578,396	£24,381,531,058	£33,113,109,454	£1,927,350,454	5.8%
Year 8	£6,076,732,187	£220,399,613	£720,000,000	£2,295,634,766	£9,312,766,566	£24,259,623,403	£33,572,389,969	£2,386,630,969	7.1%
Year 9	£6,354,610,272	£264,775,428	£750,000,000	£2,607,091,855	£9,976,477,555	£24,138,325,286	£34,114,802,841	£2,929,043,841	8.6%
Year 10	£6,440,654,903	£303,486,357	£750,000,000	£2,787,867,648	£10,282,008,908	£24,017,633,659	£34,299,642,567	£3,113,883,567	9.1%
% of Total Revenue							£326,068,877,765	£14,211,287,765	
Year 1(2019)	7.55%	0.08%	0.96%	2.16%	10.75%	89.25%	100.00%	£1,421,128,776	
Year 2	8.38%	0.11%	1.00%	3.88%	13.37%	86.63%	100.00%	4.4%	
Year 3	10.19%	0.16%	1.33%	4.73%	16.40%	83.60%	100.00%	Average Government surplus pa	
Year 4	12.02%	0.21%	1.65%	5.19%	19.07%	80.93%	100.00%		
Year 5	15.69%	0.32%	1.87%	5.21%	23.10%	76.90%	100.00%		
Year 6	16.83%	0.43%	2.02%	5.67%	24.96%	75.04%	100.00%		
Year 7	17.50%	0.54%	2.08%	6.24%	26.37%	73.63%	100.00%		
Year 8	18.10%	0.66%	2.14%	6.84%	27.74%	72.26%	100.00%		
Year 9	18.63%	0.78%	2.20%	7.64%	29.24%	70.76%	100.00%		
Year 10	18.78%	0.88%	2.19%	8.13%	29.98%	70.02%	100.00%		

### Road Mile revenue - split by vehicle type

	Year 1	Year 5	Year 10
Cars	£1,491,966,450	£3,140,982,000	£3,926,227,500
LGVs	£367,191,840	£791,982,400	£1,126,774,960
HGVs	£526,118,100	£1,189,484,400	£1,677,478,000
Motorcycles	£0	£5,122,800	£13,660,800
<b>Total Road Miles</b>	<b>£ 2,385,276,390</b>	<b>£ 5,127,571,600</b>	<b>£ 6,744,141,260</b>
Cars	63%	61%	58%
LGVs	15%	15%	17%
HGVs	22%	23%	25%
Motorcycles	0%	0%	0.2%

## Road Miles Lottery revenue

Year	Forecast Proceeds	Logic check: RM proceeds as % of UK National Lottery Revenue	Prizes	Towards Road Mile costs	Maintenance/ Projects	Lottery Duty	Buses	Total Expenses	Total
Year 1	£673,825,433	8.9%	£168,456,358	£168,456,358	£168,456,358	£80,859,052	£33,691,272	£53,906,035	£673,825,433
Year 2	£1,222,868,378	16.1%	£305,717,094	£305,717,094	£305,717,094	£146,744,205	£61,143,419	£97,829,470	£1,222,868,378
Year 3	£1,497,389,850	19.7%	£374,347,463	£374,347,463	£374,347,463	£179,686,782	£74,869,493	£119,791,188	£1,497,389,850
Year 4	£1,655,296,416	21.8%	£413,824,104	£413,824,104	£413,824,104	£198,635,570	£82,764,821	£132,423,713	£1,655,296,416
Year 5	£1,669,816,560	22.0%	£417,454,140	£417,454,140	£417,454,140	£200,377,987	£83,490,828	£133,585,325	£1,669,816,560
Year 6	£1,851,318,360	24.4%	£462,829,590	£462,829,590	£462,829,590	£222,158,203	£92,565,918	£148,105,469	£1,851,318,360
Year 7	£2,066,700,496	27.2%	£516,675,124	£516,675,124	£516,675,124	£248,004,060	£103,335,025	£165,336,040	£2,066,700,496
Year 8	£2,295,634,766	30.2%	£573,908,692	£573,908,692	£573,908,692	£275,476,172	£114,781,738	£183,650,781	£2,295,634,766
Year 9	£2,607,091,855	34.3%	£651,772,964	£651,772,964	£651,772,964	£312,851,023	£130,354,593	£208,567,348	£2,607,091,855
Year 10	£2,787,867,648	36.7%	£696,966,912	£696,966,912	£696,966,912	£334,544,118	£139,393,382	£223,029,412	£2,787,867,648
Total	£18,327,809,762		£4,581,952,440	£4,581,952,440	£4,581,952,440	£2,199,337,171	£916,390,488	£1,466,224,781	£18,327,809,762
Average pa	£1,832,780,976		£458,195,244	£458,195,244	£458,195,244	£219,933,717	£91,639,049	£146,622,478	
Allocation Percentage of Total Proceeds 25% 25% 25% 12% 5% 8% 100%									

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
No. of cars	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300	30,250,300
% playing	5%	55%	55%	57%	58%	60%	61%	62%	63%	64%
No. of weeks buy ticket	27	28	30	32	32	34	35	36	36	36
Tickets bought per we	1	1.75	2	2	2	2	2	2	2	2
of tickets bought p	449,216,955	815,245,585	998,259,900	1,103,530,944	1,113,211,040	1,234,212,240	1,291,687,810	1,350,373,392	1,372,153,608	1,393,933,824
Price of tickets	£1.50	£1.50	£1.50	£1.50	£1.50	£1.50	£1.60	£1.70	£1.90	£2.00
Lottery Revenue	£673,825,433	£1,222,868,378	£1,497,389,850	£1,655,296,416	£1,669,816,560	£1,851,318,360	£2,066,700,496	£2,295,634,766	£2,607,091,855	£2,787,867,648

### NOTES: UK National Lottery facts, for comparison National Lottery

Revenue: Year to £7,595,000,000  
 March 2016  
 32 million people play the National Lottery every week  
 3 tickets each a week on average  
 70% of 18+ play regularly ie: 45m people  
 Of which 22.5m buy 3 tickets every week

## Road Miles Auction revenue

Sector		Company	% of Total Allowance pa	No of Road Miles won at Auction	Assumed Bid Price per Mile	Auction Revenue Raised	2013 Advertising Spend	Auction Revenue as % of 2013 ad	No of UK customers	Auction mile/customer
Financial	1	Lloyds	1.0%	312,769,818	£0.010	£3,127,698	£52,128,303	6.00%	17,550,000	18
	2	Barclays	0.7%	204,213,666	£0.01	£2,042,137	£34,035,611	6.00%	11,700,000	17
	3	Halifax	0.9%	263,163,858	£0.01	£2,631,639	£43,860,643	6.00%		
	4	Direct Line	1.0%	302,920,710	£0.01	£3,029,207	£50,486,785	6.00%		
	5	Aviva	0.4%	127,813,212	£0.01	£1,278,132	£21,302,202	6.00%		
	6	Barclaycard	0.9%	260,138,520	£0.01	£2,601,385	£43,356,420	6.00%		
	7	Credit card 2	0.6%	180,000,000	£0.01	£1,800,000	£30,000,000	6.00%		
Breakdown	8	AA	0.0%	10,000,000	£0.01	£100,000	£10,000,000	1.00%	128,000	78
	9	RAC	0.0%	12,000,000	£0.01	£120,000	£12,000,000	1.00%		
Car Manufactur	10	Ford	0.3%	93,121,108	£0.01	£931,211	£46,560,554	2.00%	217,250	
	11	Vauxhall	0.2%	72,960,572	£0.01	£729,606	£36,480,286	2.00%	92,077	
	12	VW	0.2%	68,692,184	£0.01	£686,922	£34,346,092	2.00%	73,409	
	13	Renault	0.2%	53,477,018	£0.01	£534,770	£26,738,509	2.00%		
	14	BMW	0.2%	53,094,106	£0.01	£530,941	£26,547,053	2.00%		
	Media	15	Sky	4.4%	1,321,693,925	£0.01	£13,216,939	£264,338,785	5.00%	12,000,000
	16	BT	2.5%	748,940,595	£0.01	£7,489,406	£149,788,119	5.00%		
	17	ITV	2.5%	750,000,000	£0.01	£7,500,000	£150,000,000	5.00%		
	18	Virgin Media	1.5%	441,786,110	£0.01	£4,417,861	£88,357,222	5.00%	5m customer	88
Social Media	19	Google	2.7%	800,000,000	£0.01	£8,000,000	£4,000,000,000	0.20%	According to business insider google spend 4	
	20	Facebook	2.7%	800,000,000	£0.01	£8,000,000	£4,000,000,000	0.20%		
Newspaper/Ma	21	The Telegraph	0.1%	15,000,000	£0.01	£150,000	£5,000,000	3.00%		
	22	Company 2	0.1%	15,000,000	£0.01	£150,000	£5,000,000	3.00%		
Utilities	23	SSE	0.6%	175,000,000	£0.01	£1,750,000	£35,000,000	5.00%		
	24	Npower	0.4%	131,547,176	£0.01	£1,315,472	£26,309,435	5.00%	7m custome	19
	25	British Gas	1.0%	300,679,260	£0.01	£3,006,793	£60,135,852	5.00%	16m custom	19
	26	EDF	0.4%	107,116,986	£0.01	£1,071,170	£21,423,397	5.00%	5.7m custom	19
Supermarkets	27	Tesco	1.9%	581,347,630	£0.01	£5,813,476	£116,269,526	5.00%	20m	29
	28	Sainsburys	1.0%	303,492,765	£0.01	£3,034,928	£60,698,553	5.00%	15.5m Necta	20
	29	Morrisons	1.4%	407,612,955	£0.01	£4,076,130	£81,522,591	5.00%	12m	34
High Street Ret	30	Marks & Spen	1.0%	304,261,008	£0.01	£3,042,610	£50,710,168	6.00%	32m	10
	31	Next	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%	4.6m Next D	33
	32	John Lewis (lo	0.5%	162,828,440	£0.01	£1,628,284	£32,565,688	5.00%	7m custome	19
	33	Debenhams	0.4%	121,385,110	£0.01	£1,213,851	£24,277,022	5.00%	16m custom	19
	34	Post Office	0.4%	108,583,805	£0.01	£1,085,838	£21,716,761	5.00%	5.7m custom	19
	Phone compani	35	Vodafone	1.2%	372,973,730	£0.01	£3,729,737	£74,594,746	5.00%	20m
	36	Dixons Carph	0.7%	200,000,000	£0.01	£2,000,000	£40,000,000	5.00%	15.5m Necta	20
	37	Samsung	0.9%	267,824,095	£0.01	£2,678,241	£53,564,819	5.00%	12m	34
	38	O2	0.7%	206,696,695	£0.01	£2,066,967	£41,339,339	5.00%	32m	10
Food Companie	39	McDonalds	1.2%	360,742,740	£0.01	£3,607,427	£72,148,548	5.00%	4.6m Next D	33
	40	Mars Confect	1.3%	386,533,400	£0.01	£3,865,334	£77,306,680	5.00%		
	41	Kelloggs	0.7%	217,407,555	£0.01	£2,174,076	£43,481,511	5.00%		
	42	Coca Cola GB	0.5%	164,922,370	£0.01	£1,649,224	£32,984,474	5.00%		
Other	43	Glaxosmithkii	0.5%	159,564,620	£0.01	£1,595,646	£31,912,924	5.00%		
	44	GoCompare	0.5%	139,080,350	£0.01	£1,390,804	£27,816,070	5.00%		
	45	Company 2	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
	46	Company 3	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
	47	Company 4	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
	48	Company 5	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
	49	Company 6	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
	50	Company 7	0.5%	150,000,000	£0.01	£1,500,000	£30,000,000	5.00%		
Companies 1 - 50			13,136,386,093		£131,363,861	£10,366,104,689	1.27%			
Other Compani	200	Companies	56.2%	16,863,613,907	£0.01	£168,636,139				
Total Companies	250		100%	30,000,000,000		£300,000,000				






WOLFSON  
ECONOMICS PRIZE  
MMXVII

Policy  
Exchange

<https://policyexchange.org.uk/wolfsonprize/>

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