



# TUBA Demonstration Examples

Version 1.9

September 2012  
Department for Transport



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# 1. Introduction

This document is intended as a guide to the demonstration data provided with TUBA. This data provides the opportunity for TUBA users to familiarise themselves with the operation of TUBA using a simple data set. A number of different examples are provided to illustrate a number of features of TUBA that are discussed in the user manual and the TUBA guidance document.

Most of the examples use the standard economic parameters file that is supplied with the software. They differ in the data contained in the scheme file and in the matrix data that are used. A TUBA batch file is supplied for each example which can be opened in the TUBA interface.

The next chapter of this document explains the scenarios represented by the data. Thereafter, each of the examples is dealt with in turn. Each example is intended to illustrate a particular feature of TUBA. These include:

- Automatic calculation of preparation and supervision costs
- Automatic calculation of scheme cost profiles
- Use of 'all purpose' and 'all person type' data
- Using TUBA to split aggregate trip matrices into different vehicle types
- Using bus vehicle highway data to approximate bus passenger benefits
- Appraisal of a road pricing scheme

## 2. The Scenarios

### **2.1 Transport model**

The do-nothing road network is illustrated in Figure 2.1. It consists of a main road, running east-west, with a number of junctions with minor roads. A bottleneck is created by a set of signals. The area is also served by a number of bus services.

The road network is modelled using the CONTRAM dynamic assignment software. The model covers the period 0700-1900 with 30-minute time slices in the peaks (0700-1000, 1600-1900) and a single 6 hour time slice for the inter-peak (1000-1600). Five different user classes are used, representing working and non-working cars, LGVs, OGVs, and buses.

Passenger demand for the bus services is modelled using a VIPS public transport model. 3 periods are modelled: AM peak, inter-peak, and PM peak. Passengers in working and non-working time are represented as different user classes in the model, with different values of time for behavioural modelling.

The two models are linked together with a simple binary logit mode choice model between car and bus travel. This choice is modelled only for consumer trips.

Some changes to the model were made for the road pricing example. These are discussed in Section 4.3. Trip generation, distribution, departure time and land-use effects have been ignored.

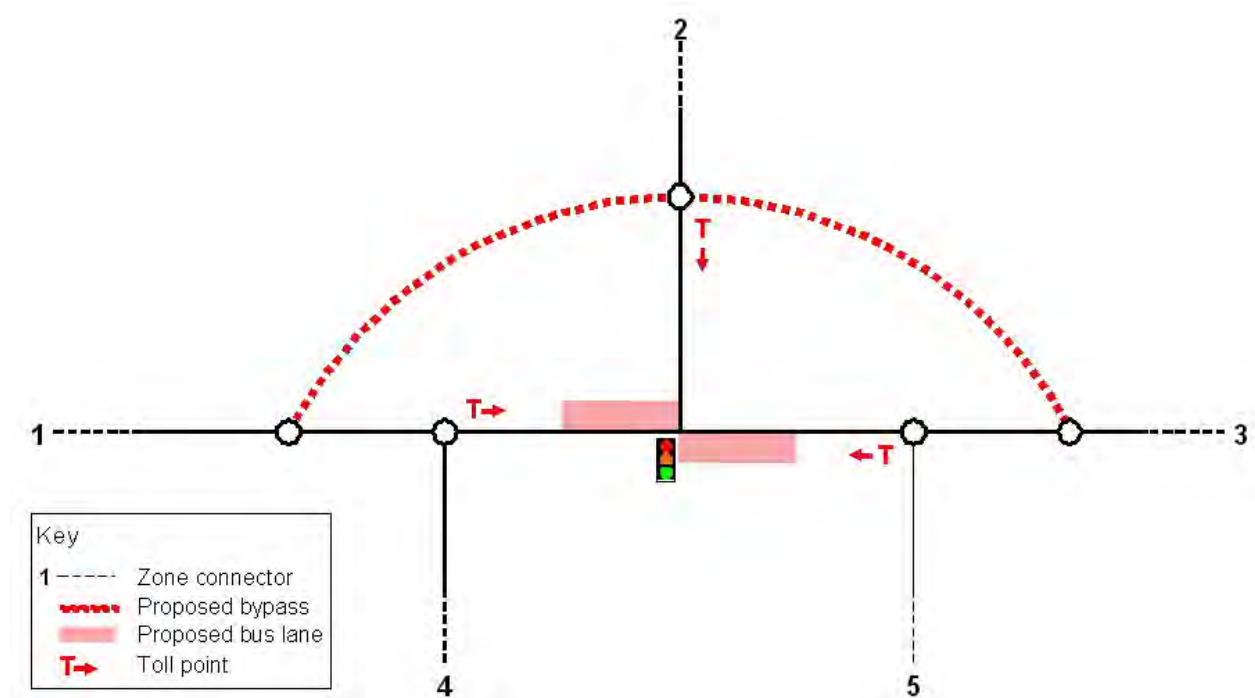
### **2.2 Schemes**

Three alternative schemes are tested, each of which is designed to relieve the pressure at the signals bottleneck. The first is a bypass scheme; the second is a bus lane on the main road on the approach to the signals, with bus priority at the signal; the third is a road pricing scheme. The schemes are shown in Figure 2.1.

Two years are modelled, 2015 (assumed to be the scheme opening year) and 2030.

Four examples are presented. Example 1 deals with the bypass and Example 2 deals with the bus scheme. Example 3 shows an alternative way of dealing with the bypass. Example 4 is the road pricing example, and includes a worked example of the benefit calculation.

Figure 2.1: Example network showing proposed schemes



### 3. Setting Up TUBA Input Data

#### 3.1 ***Batch files***

The batch files use the naming convention

EXAMPLEX.BAT

where X is the number of the example.

Batch files can be opened using the File->Open menu in the TUBA user interface.

The supplied batch files assume TUBA has been installed on the c: drive of the user's computer.

#### 3.2 ***Economics data***

The standard economics file supplied with TUBA is used for examples 1 to 3. For the road pricing example a modified version is used. This is explained further in Section 4.4.3.

#### 3.3 ***Scheme and matrix data***

The scheme and matrix data differ between examples and are described in more detail below as part of the discussion for each example. The scheme data files use the naming convention

EXAMPLEX\_SCHEME.TXT

where X is the number of the example.

Each of the scheme files is reproduced in Appendix A. The data can also be viewed from the user interface by opening the appropriate .bat file and viewing the templates under the Scheme menu. Each of the data tables corresponds to one template in the user interface.

## 4. The Examples

### 4.1 Example 1

#### 4.1.1 Overview

Example 1 shows how the data from the highway and PT models can be used to calculate the benefits of the bypass.

#### 4.1.2 Scheme data

##### i. Parameters

The first 3 scheme parameters provide a description of the TUBA run.

The first modelled year is assumed to be the same as the scheme opening year (2015). For a 60 year appraisal period the horizon year is therefore 2074. Model data is provided for the years 2015 and 2030. The current year is 2010. The ‘detailed results’ option is selected to enable more detailed analysis of the results. The scheme files in this document limit the number of warnings printed to 10 of each type (print\_warn) but the files installed on the user’s hard disk include all warning messages.

##### ii. Time slices

Data is provided for time slices covering the weekday period 0700-1900. Following the advice in the guidance document annualisation factors of 253 are used for each time slice. This will provide annualised benefits for weekdays 0700-1900 but not for the period 1900-0700 or for weekends.

##### iii. Scheme cost and profit data

No costs are specified for the DM

This is a highway scheme so DS costs are allocated to mode 1. It is assumed the costs are paid by central government.

The scheme will start construction in 2013 with completion in 2015. It is currently at the Order Publication (OP) stage; this information is only used for the calculation of preparation costs.

Construction (C) and land (L) costs are specified in 2009 costs, so RPI in the scheme costs table has been defined as 214.0. There are no maintenance, operating or grant costs. Costs are specified in thousands of pounds. In this case factor costs (F) have been used, which will be the case in most applications.

Preparation and supervision costs are to be calculated automatically so ‘default’ is entered in the total cost column. The remaining columns are left blank.

All costs are assumed to be paid by central government (‘cen’).

Automatic profiles of land, preparation and supervision costs are assumed, hence the values of -1.0 in the profile table. Construction is from mid 2013 to mid 2015 so the construction cost profile has 25% of costs in 2013, 50% in 2014 and 25% in 2015.

Some construction delays are assumed to occur throughout the construction period.

#### iv. User classes

The user class specification is:

**Table 4.1: User class specification for example 1**

User class	Veh type/submode	Purpose	Person type
1	Car	Business	All
2	LGV freight	All	All
3	OGV1	All	All
4	Bus	Business	Driver
5	Car	Commuting	All
6	Bus	Commuting	Passenger
7	Bus	Business	Passenger
8	Car	Other	All
9	Bus	Other	Passenger

The corresponding data table/template is

#### USER\_CLASSES

*no.	Veh/submode	purpose	person_type
1	1	1	0
2	3	0	0
3	4	0	0
4	6	1	1
5	1	2	0
6	6	2	2
7	6	1	2
8	1	3	0
9	6	3	2

For cars the three trip purposes have been modelled separately and therefore the purpose can be specified. The person type is specified as 0, indicating 'all person types' (i.e. vehicles). The program will use the person type splits in the economics file to calculate values of time per vehicle. For the goods vehicles the different purposes have not been modelled separately so a purpose of 0 ('all purposes') is specified<sup>1</sup>. For simplicity it is assumed that there are no OGV2 or LGV personal vehicles in this example. Example 3 will look at how to split LGV and OGV matrices to deal with this situation.

The treatment of buses follows the advice in the guidance document for the situation where we have a highway model of bus vehicles and a PT bus passenger model. The bus vehicle highway data is identified

<sup>1</sup> In fact the standard economics file purpose splits specify that for LGV (freight) and OGV1 100% of trips are 'business' purpose, so in this particular case it would also be acceptable to specify purpose 1 ('business') for these user classes. Similarly, OGVs have no passengers so person type 1 (driver) could be specified.

with the working bus driver user class – this is used to calculate driver time benefits and vehicle operating benefits (these are both operator benefits rather than user benefits). The bus PT passenger data is identified with the bus passenger user classes – in this case business, commuting and other purposes are modelled separately. Example 3 will deal with the situation where no PT passenger model is used.

#### v. Matrix data

All matrix data in this example are in format 3, allowing multiple time slices and user classes to be included in a single file. Matrix files from VIPS have a .prn extension, those from CONTRAM have a .dat extension.

The file naming convention is as follows:

`year_scenario_model_data_purpose.*`

Year is 2015 or 2030

Scenario is *dn* (do nothing), *rs* (bypass road scheme) or *bl* (bus lane – used in example 2)

Model is *hw* (highway – CONTRAM) or *pt* (public transport – VIPS)

Data is *time*, *trips* or *dist* (distance)

Purpose is *wk* (business) or *nwk* (consumer)

For example the file ‘2015\_dn\_pt\_times\_wk.prn’ contains 2015 public transport times for business trips for the do nothing scheme.

The exception to this is the PT fares matrix (ALL\_YRS\_PT\_FARES.PRN) which is assumed to remain the same (in real terms and perceived costs in each scenario and each year). Note that because PT fares do not attract VAT it is possible to use the same fare matrix for business commuting and other trips. For charges that are taxed then the matrices should be in perceived costs, i.e. inclusive of VAT for commuting and other trips and net of VAT for business trips.

Note that distance matrices are needed only for highway modes (for the calculation of VOC benefits).

CONTRAM matrices are in units of vehicles/hr for trips, hours for time and kms for distance. VIPS matrices are in minutes for time and passengers/hr for trips. A factor of 0.0167 is therefore specified for PT times to convert from minutes to hours.

Note that in both CONTRAM and VIPS the skimmed cost matrices (time and distance) are averages over all the routes that are used, and not just from a single current minimum cost route (see guidance document for fuller discussion).

In this particular example the only demand response (apart from reassignment) is assumed to be mode split, but this is applied to commuting and other trips only. Therefore the same PT trip matrix for business trips is used for the DM and DS scenarios.

In accordance with WebTAG, bus travel times are actual times for business trips. For commuting and other trips waiting and transfer times have been given a weight of two and a half time in-vehicle times, hence these times are generalised times not actual times.

In this scheme there is assumed to be no change in the charge matrices (PT fares – there are no road tolls); therefore there will be no user charge benefits. However, a PT fare matrix has been defined to allow the impact of changes in patronage on bus operator revenues to be calculated.

#### **4.1.3 Results**

The results files from each example can be found in Appendix C. The list of error messages has been truncated in some cases – the full output files can be found in the directory where the demonstration files have been installed on the user's computer. The following sections discuss each part of the output file in turn.

##### i. Warnings

The first table in the output is a list of warnings relating to the input data. These relate to the ratio of DM to DS costs (times and distances) and that in some cases this is outside of the expected range (see manual for full details of the checks made), even to the extent of generating a serious warning in some instances. This is partly because we are using a very small network – DM costs are quite small so a low absolute cost change can still be a significant proportional cost change. (The copy of the output in Appendix C is limited to 10 warnings of each type. See the electronic version for a full list of warnings.)

In general a warning message of this type (particularly a serious warning) should be followed up by the user checking the input data, to ensure it is not an error in the data that is triggering the message. If the data is correct and there is genuinely a large cost change then the user should consider whether the rule of a half, which is at the heart if TUBA, is appropriate for their case. The TUBA support team ([tuba@DMQJVREDOFRP](mailto:tuba@DMQJVREDOFRP)) can be contacted for advice.

##### ii. Input summary

This shows the run names given in the scheme file, and the names of the scheme and economics files used. There is also a list of the years covered: the first year, in which costs are incurred, the first and last years for user benefit calculations and the modelled years. Finally there is a summary of hours modelled in each time period (derived from the annualisation factors). A full year has a total of 8760 hours. In this case we only have 3036 since we are only dealing with the weekday period 0700-1900.

##### iii. Scheme costs

Three tables deal with scheme costs: DM\_SCHEME\_COSTS, DS\_SCHEME\_COSTS and PRESENT\_VALUE\_COSTS. The first two are similar. They give a breakdown of the 7 different cost types. These are undiscounted, but include any market price adjustment and the application of RPI factors so that the costs are in base year (2002) market prices. The tables allow the automatic calculation of preparation and supervision costs to be verified. For example, it can be seen that the total preparation costs are 6% of the total land and construction costs. Similarly, automatic profiles calculations can be checked: preparation is between the current year and the first year of construction; supervision runs concurrently with the construction period and land costs are all incurred in the first year of construction.

In the PRESENT\_VALUE\_COSTS table the first 6 components of scheme costs have been added together and discounted. Note that any grant/subsidy or developer contribution will not appear in this table: the cost to the public sector and the equivalent negative cost to the private sector cancel each other out.

Note that delays during construction and maintenance do not appear in this table. They can be found in the user benefits section of the TEE table at the end of the output file.

#### iv. Total user costs

DM&DS\_USER\_COSTS gives the total user costs for each scenario. This is intended to provide a context for the level of benefits that are calculated. In a fixed trip matrix appraisal the user benefits will be equal to the difference between DM and DS user costs. This is not the case with a variable trip matrix appraisal.

#### v. Fuel consumption and carbon emmisions

Fuel consumption tables gives DM and DS fuel consumption by mode, year, scenario and fuel type. There are two tables to illustrate carbon emissions. They report carbon emissions by submode and time period by scenario. Emissions are given in tonnes and thousands of pounds.

#### vi. Disaggregate user benefits and revenues

The output file continues with a series of tables giving user benefits, changes in operator revenues and changes in government indirect tax revenues disaggregated by various categories: MODE, SUBMODE, PERSON\_TYPES, PURPOSE, PERIOD, NON MONETISED TIME BENEFITS BY TIME SAVING, MONETISED TIME BENEFITS BY TIME SAVING, TOTAL BENEFITS BY TIME SAVING, NON MONETISED TIME BENEFITS BY DISTANCE, MONETISED TIME BENEFITS BY DISTANCE and TOTAL BENEFITS BY DISTANCE. Only the first of these contains data for every year of the appraisal period; all the rest show data for the modelled years and for the total appraisal period.

For benefits, a negative indicates a disbenefit to users. For revenues a negative indicates a reduction in revenues.

Given that PT fares are not subject to taxes it might be surprising that there is an increase in indirect tax revenue. However, this is calculated using the assumption that, for consumer trips, a change in spending on transport is offset by a change in spending elsewhere in the economy. In this example there is a reduction in expenditure on PT fares which is then spent elsewhere in the economy. Because the average indirect tax rate in the economy is higher than that for PT fares there is an increase in indirect tax revenues.

#### vii. Sensitivity table

This table shows total user benefits as a percentage of total DM user costs.

#### viii. Economic efficiency of the transport system (TEE) table, Public accounts (PA) table and Analysis of monetised costs and benefits (AMCB) table

The TEE, PA and AMCB tables are some of the most important outputs from TUBA, providing a summary of all the scheme cost, user benefit, and revenue calculations.

## **4.2 Example 2**

### **4.2.1 Overview**

Example 2 shows how the data from the highway and PT models can be used to calculate the benefits of the bus priority scheme.

### **4.2.2 Scheme data**

#### i. Parameters

Only the names given to the TUBA run and to the scenarios differ from Example 1.

#### ii. Time slices

The time slices are the same as in Example 1.

#### iii. Scheme cost and profit data

Specification of scheme costs is slightly more complicated than for Example 1. The scheme (a bus lane) would be constructed by the (public sector) highway. However, the (private sector) bus operator has an increase in operating costs due to the increased bus frequency. These extra costs cover vehicle purchase and operating and extra drivers<sup>2</sup>.

To deal with this two modes (1 (private road) and 3 (bus)) are identified in the scheme specification table (DS\_SCHEMES).

In the specification of the total costs, construction (C) and land (L) costs are assumed to be paid by local government ('loc'). Preparation and supervision costs are calculated automatically (as % of land and construction –neither of these costs will be paid by the private sector in this case). The scheme is assumed to be at the SI (Scheme Inception) stage.

The private sector operator has an increased operating cost (O). To compensate for this a small grant (G) (say, towards the purchase of new vehicles) is paid to the operator by local government.

Construction costs are spread equally between the two construction years<sup>3</sup> with the grant payment being made in the scheme opening year. Default profiles are used for other costs. For operating costs this means costs are spread equally from the scheme opening year to the end of the appraisal period.

There are no delays during construction.

#### iv. User classes

The user class specification is as follows.

<sup>2</sup> Rather than entering full operating costs for both the DM and DS costs are entered as zero in the DM and only the additional costs entered for the DS. The effect is the same as the appraisal depends on the difference in costs between the DM and DS.

<sup>3</sup> This does not necessarily imply a two year construction period, e.g. the period could be November 2009 to February 2010.

USER_CLASSES			
*no.	Veh/submode	purpose	person_type
1	1	1	0
2	3	0	0
3	4	0	0
4	6	1	1
5	1	2	0
6	6	2	2
7	6	1	2

#### v. Matrix data

The matrix data follow the same pattern as for Example 1.

#### 4.2.3 Results

Results are given in Appendix C.

The print out of scheme costs is much longer than for Example 1 because scheme costs are incurred over the full appraisal period owing to the ongoing extra operating costs. Note that the grant/subsidy payment appears once in the TEE table as a revenue to the private sector and again in the public accounts table as a cost.

### 4.3 Example 3

#### 4.3.1 Overview

Example 3 deals with the same scheme as Example 1, but differs in a number of ways:

- It is assumed that PT passenger model data is not available; bus vehicle highway data are used to estimate passenger benefits
- It shows how an 'All LGV' matrix can be split between personal and freight using the matrix factors; similarly for splitting an 'All OGV' matrix
- Matrices are in format 2

It will be seen that using format 2 matrices requires a much larger number of matrix files than format 3. For this reason, in this example only the first time slice (0700-0730) and first modelled year (2015) are used. The aim is to illustrate the approach used rather than provide a complete scheme file.

#### 4.3.2 Scheme data

##### i. Parameters

Apart from the TUBA run name these are the same as for Example 1.

##### ii. Time slices

Only the first time slice (0700-0730) is included in this example.

### iii. Scheme cost and profit data

The scheme cost and profile data are the same as in Example 1.

### iv. User classes

The user class specification is:

**Table 4.2: User class specification for example 3**

User class	Veh type/submode	Purpose	Person type
1	Car	All	All
2	LGV freight	All	All
3	OGV1	All	All
4	Bus	Business	Driver
5	LGV personal	All	All
6	OGV2	All	All
7	Bus	All	Passenger

The corresponding data table/template is

#### USER\_CLASSES

```
*no. Veh/submode purpose person_type
1 1 0 0
2 3 0 0
3 4 0 0
4 6 1 1
5 2 0 0
6 5 0 0
7 6 0 2
```

The two LGV user classes will be split from the same 'All LGV' trip matrix. Similarly, OGV1 and OGV2 will be split from the same 'All OGV' matrix. This will be explained in more detail in the next section.

The bus user classes have been set up in accordance with the advice in the TUBA guidance document for the situation where no PT bus passenger data is available. As in Examples 1 and 2 there is a business bus driver user class and a bus passenger user class. In this case the bus passenger is 'All purposes' rather than being split between purposes. A bigger difference with the previous examples will be seen in the matrix specification in the next section.

### v. Matrix data

The matrices are based on those used in Example 1, with the following changes:

- Format 2 is used, requiring a separate file for each user class and time slice
- Only data for the first time slice are used
- Trips for working and non-working cars have been added together for one user class

- The bus passenger data from the PT model is not used

The file naming convention is similar to that used for Examples 1 and 2 with the following modifications:

- The user class number is appended to the file name (for classes 1-4, data for other classes are derived from these classes)
- The extension is csv, indicating that format 2 requires comma-separated variables

For example, the file '2015\_DN\_HW\_dist3.csv' contains 2015 distances from the CONTRAM model for user class 3 for the do minimum scenario.

When splitting the 'All LGV' matrix it is assumed that 28% of LGV trips are personal (72% are freight). Therefore a factor of 0.72 is applied to the trip matrix for user class 2 (LGV freight) and a factor of 0.28 is used for class 5 (LGV personal). Note that no further factoring of the time and distance matrices is required provided they are in the correct units. A similar procedure is used to split the OGV matrix into OGV1 and OGV2, assuming a 60/40 split.

Bus passenger data is derived from the bus vehicle data. The bus vehicle trip matrix is converted to a passenger matrix using a factor of 12.2 – the average number of passengers per bus (obtained from WebTAG Unit 3.5.6). This is specified as matrix type P (passenger). Since this has type P it is not necessary to specify a distance matrix. Note that this can only be a crude approximation – the OD matrix of buses is likely to be different to the OD matrix of passengers (which will include passengers getting on and off the bus at intermediate stops). Furthermore, this method will not include full OD passenger costs and does not allow the weighting of travel times in accordance with GOMMMS (only in-vehicle times are considered). Also, in this example the number of bus vehicles does not change between the DM and DS and therefore neither does the number of passengers. The effects of any mode split on user fare benefits or on operator revenues cannot be identified using this method. This emphasises the importance of using a public transport model when significant impacts on public transport users are expected.

#### **4.3.3 Results**

The results are in Appendix C. The benefits are very small because we are only calculating them for one 30 minute time slice in one year.

#### **4.4 Example 4**

(Please note that the parameters used including the base year of the economics are those used in TUBA version 1.8 . It was considered not necessary to update these calculations for the new version of WebTag. Please contact TUBA support for any areas of the calculation that require further information.)

##### **4.4.1 Overview**

Example 4 gives an example of using TUBA for the appraisal of a road pricing scheme. For simplicity only a single year (2025) is included in the appraisal. In practice, of course, the full 60 year appraisal period, should be included. Otherwise, it is consistent with the guidance for appraisal of road pricing schemes given in WebTAG Unit 3.12.3.

The scheme modelled is a £2 charge to enter the centre of the town, the revenues being received by local government. It was assumed that bus vehicles were exempt from the charge.

#### **4.4.2 Modelling**

For the assignment and demand models non-work trips were split into three groups, according to the household income tercile. Within the modelling system each tercile was given a different value of time.

#### **4.4.3 Economics file**

The standard TUBA economics file was modified to reflect the segmentation by income. This can be done in a number of ways, for example by segmenting the vehicle types/submodes, person types or purposes. In this particular case the purposes were segmented, as follows:

**Table 4.3: Segmentation by income for example 4**

Purpose	Income range	Perceived value of time (£/hr)
Non-work, low income	<£17, 500	£3.35
Non-work, mid income	£17, 500 to £35,000	£4.56
Non-work, high income	>£35,000	£5.75

(2002 prices and values, note that for non-work purposes the value of time is the same for all modes.)

Other economics data which depends on purpose (value of time growth, and vehicle occupancies (person factors)) was assumed to be the same over all terciles

The default purpose splits were also modified for consistency, though that data would not actually be used in this example as all matrix data is explicitly defined by purpose.

A full listing of the economics file is given in Appendix B.

#### **4.4.4 Scheme data**

##### i. Parameters

These are similar to Example 1, with the Run Name and DS scheme name changed. In this example we are only calculating the benefits for a single year, 2025.

##### ii. Time slices

The time slices are the same as in Example 1.

##### iii. Scheme cost and profit data

Note that capital and operating costs for the road pricing scheme have *not* been included in this example. This means that the reported PVC includes only the impact on public sector revenues and the BCR and NPV will not have any real meaning.

#### iv. User classes

The user class definition reflects the increased segmentation by income:

**Table 4.4: User class definition for example 4**

User class	Veh type/submode	Purpose	Person type
1	Car	Business	All
2	LGV freight	Business	All
3	OGV1	Business	All
4	Bus	Business	Driver
5	Car	Non-work, low income	All
6	Car	Non-work, mid income	All
7	Car	Non-work, high income	All
8	Bus	Business	Passenger
9	Bus	Non-work, low income	Passenger
10	Bus	Non-work, mid income	Passenger
11	Bus	Non-work, high income	Passenger

#### v. Matrix data

The matrix data follow the same pattern as for Example 1.

### 4.4.5 Results

The full results file from this example is given in Appendix C.

The following table is part of the supporting analysis required by WebTAG Unit 3.12.3 on the appraisal of road pricing schemes.

**Table 4.5: User benefits (£thousands, 2002 prices discounted to 2002)**

	User classes (defined by journey purpose / income / mode)								Total	
	Car				Bus		LGV & OGV			
	Business	Non business low income	Non business mid income	Non business high income	Business	Non business				
Travel Time	232	36	60	60	18	40	87	533		
Vehicle Operating Cost	11	30	24	3	0	0	14	82		
User Charges	-512	-447	-545	-427	0	0	-483	-2414		

During Const. and Maint.	0	0	0	0	0	0	0	0
Net User Benefit	-269	-381	-461	-364	18	40	-382	-1799

Most of the information required for this table can be obtained from the standard TUBA output file, for instance in the breakdown of results by purpose or vehicle type. If necessary the detailed results analysis option can be used to provide an even more detailed breakdown, for example by purpose and vehicle type together. The exception to this is the delays during construction and maintenance which are broken down only by mode and consumer, business (personal) and business (freight)<sup>5</sup>.

In this case there are time and vehicle operating cost benefits. The charge switches travellers from road to bus, leading to reduced travel times for car and bus users. This also results in more fuel-efficient car speeds, hence the VOC benefits. There is a user disbenefit from road pricing. In this particular example this is large enough to offset the positive time and VOC benefits.

Examination of the user time benefits broken down by purpose shows that it is actually the middle income tercile that gains the greatest time benefits when expressed in monetary terms. Although their value of time is less than the high income group, they make more significantly more non-work trips. On the other hand, because they make more trips they experience the highest user charge disbenefit.

A summary of benefits and costs is shown in Table 4.6 below. For a full breakdown of the PVB and PVC, see the full TUBA output file in Appendix C.

**Table 4.6: Summary of benefits and costs (£thousands, 2002 prices discounted to 2002)**

Net user benefits	-1798
Increase in private sector revenue	537
Wider public finances (indirect taxation revenues)	-403
<b>PVB (excluding greenhouse gases)</b>	<b>-1664</b>
Decrease in local authority toll revenue	-2524
<b>PVC (partial)</b>	<b>-2524</b>
<b>NPV (partial)</b>	<b>860</b>

Note that some further manipulation of the results from the main TUBA output file has been necessary. Bus operating cost benefits are considered to be a saving to the private sector provider, rather than a user benefit. This does not affect the PVB but does affect the way the PVB is broken down into its components. There is a reduction in wider public finances (central government indirect tax revenue) mainly as a result of decreased fuel consumption. There is an increase in private sector revenue (bus fares) as a result of increased bus use.

On the public accounts side there is a significant revenue from the charge for local government. Remember that capital and operating costs have not been included in this analysis.

<sup>5</sup> These delays are calculated outside TUBA and input by the user as part of the scheme cost information.

Note that the user charge disbenefit and the increase in local government revenue are not of the same magnitude and do not cancel each other out in the NPV. This can be explained in terms of the convention of the attribution of benefits by source used in TUBA. This means that the reported toll disbenefit also includes the disbenefit due to increased expenditure and travel time experienced by those switching to bus in the DS, even though those people do not actually pay the toll, i.e. the charge disbenefit is not the same as the total money actually spent on the toll. For more details of how this affects the formulae used in the calculation of revenues below see the worked example below or the TUBA FAQ list.

Note that because no bus supply change has been modelled, bus user benefits and the increase in operator revenues may be underestimated.

Because the capital and operating costs have not been included in this example the PVC is underestimated. Based on just a single year's benefits and revenues the scheme is generating a positive NPV. Extended to 60 years, this is likely to remain positive even when scheme costs have been taken into account

In cases such as this, with a negative PVB and negative PVC it is not meaningful to calculate the BCR.

#### **4.4.6 Worked example**

TUBA results from road pricing can often appear counter-intuitive. The results presented above can be more readily understood with a worked example showing the details of the calculations. To simplify the calculations the input data has been restricted as follows:

- Single OD pair (1 to 3 – the main route through the network)
- Single 30 minute AM peak timeslice
- Four user classes only: two submodes (car and bus) with two purposes each (work and non-work mid income)<sup>6</sup>.

The following sections describe the calculation of the following user benefits and revenues:

- User time benefit
- User charge benefit (toll and charge)
- Change in operator revenues (toll and charge)
- Change in government indirect tax revenues

Wherever possible the notation used is consistent with WebTAG Unit 3.5.3<sup>7</sup>.

For clarity there is some rounding of numbers in the values presented in the calculations. However, the calculations are carried out using unrounded numbers and therefore the reader carrying out the calculations for themselves might find small differences from the results presented.

##### i. Input data

The input trip matrix data is:

<sup>6</sup> Low and high income non-work trips are not included in this example as they use exactly the same formulae as mid income trips for the calculation of benefits and revenues.

<sup>7</sup> <http://www.dft.gov.uk/webtag/documents/expert/unit3.5.3.php>

**Table 4.7: Input data**

User class	1	6	8	10
Vehicle type/submode	Car	Car	Bus	Bus
Purpose	Work	Non-work Mid income	Work	Non-work-M Mid income
DM trips (T0)	100.85	144.42	10.83	52.72
DS trips (T1)	99.92	110.11	11.95	111.74
DM time (J0)	0.3045	0.3044	0.5757	0.8128
DS time (J1)	0.2471	0.2471	0.5180	0.7552
DM distance (D0)	9.688	9.688	Not needed	Not needed
DS distance (D1)	9.688	9.688	Not needed	Not needed
DM fare (M0fare)	N/A	N/A	195	195
DS fare (M1fare)	N/A	N/A	195	195
DM toll (M0toll)	0	0	N/A	N/A
DS toll (M1toll)	200	200	N/A	N/A

(Distances are in kms, time in hours and fares/tolls in pence.)<sup>8</sup>

Note that tolls and fares are input as perceived costs in pence which are subsequently transformed into resource costs within TUBA. In this case the assumption has been made that no taxes are applicable to tolls or PT fares and therefore there is no difference between resource and perceived costs. It is the resource cost charges that are used in the following calculations.

In this case the annualisation factor input into TUBA is 253 (=1 of these time slices in the AM peak x 253 AM peak periods in the year). In the input data trips are expressed as trips per hour so an additional factor of 0.5 is applied to get from hourly benefits to benefits per time slice (this is calculated and applied automatically by TUBA from the input time slice definition (i.e. length of timeslice)). The combined factor applied to get from hourly benefits to annualised benefits is therefore 0.5 \* 253=126.5

In the following calculations all results are discounted to a present value year of 2002 using a discount rate of 3.5% p.a.

## ii. User time benefit calculation

The basic formula used is:

$$\text{benefit} = \frac{1}{2} (T^0 + T^1) (J^0 - J^1)$$

---

<sup>8</sup> Note that work and non-work PT times are different because, in accordance with WebTAG, walking and waiting times for the latter have been weighted.

which is further adjusted to convert to market prices, and to apply annualisation and discounting.

For car benefits some initial calculations are required to calculate VOTs for 2025 and to convert from VOT/person to VOT/vehicle.

Using the VOT annual growth rates in the TUBA standard economics file (consistent with WebTAG) gives growth in VOT of 38.0% for work and 29.6% for non work purposes from 2002 to 2025. The 2002 VOTs can then be updated to 2025 values as follows:

**Table 4.8: Calculation of 2025 VOTs (perceived costs)**

Veh type	Purpose	Person type	2002 VOT (p/hr)	2025 VOT (p/hr)
Car	Work	Driver	2186	3017
Car	Work	Passenger	1566	2161
Car	Non-work mid-income	Driver	456	591
Car	Non-work mid-income	Passenger	456	591
Bus	Work	Passenger	1672	2308
Bus	Non-work mid-income	Passenger	456	591

Similarly 2025 person type factors (occupancies) can be calculated from the 2002 figures and associated growth rates to give 0.21 passengers per vehicle for working cars and 0.34 for non-working cars (AM peak). This gives the following 2025 VOTs per vehicle:

**Table 4.9: Calculation of 2025 VOTs per vehicle**

Veh type	Purpose	2025 VOT (p/hr)
Car	Work	3471 (=3017+0.21*2161)
Car	Non-work	792 (=591+0.34*591)

User time benefits are then calculated as follows:

**Table 4.10: User time benefit calculation**

User class	1	6	8	10
User time benefit (hourly rate, resource costs £)	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Annualisation and discounting	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Conversion to market prices	Error! Objects cannot be created from editing field codes.	= 3310	Error! Objects cannot be created from editing field codes.	= 1610

Note that for work trips perceived costs need to be multiplied by the (1+t) adjustment factor (1.209) to convert to market prices. This adjustment is not required for non-work trips as perceived costs are already in the market price unit of account.

### iii. User charge benefit calculations

The basic formula used is:

$$\text{benefit} = \frac{1}{2} (T^0 + T^1)(M^0 - M^1)$$

which is further adjusted to convert to market prices, and to apply annualisation and discounting.

Note that for PT fare  $M^0 = M^1$ , hence the benefit is zero and is not included in the table below.

**Table 4.11: User charge benefit calculation**

User class	1	6
User toll benefit (hourly rate, resource costs £)	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Annualisation and discounting	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Conversion to market prices	Error! Objects cannot be created from editing field codes.	= -14595

As for time benefits, the factor of 1.209 to convert to market prices is needed for work trips only. If charges were taxed an additional factor to convert from resource to perceived costs would be necessary for non-work trips.

### iv. Increase in operator revenues

The basic formula used is:

$$\text{revenue} = T^1 M^1 - T^0 M^0$$

**Table 4.12: Operator revenue calculations**

User class	1 (toll revenue)	6 (toll revenue)	8 (fare revenue)	10 (fare revenue)
Operator revenue (hourly rate, resource costs £)	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Annualisation and discounting	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Conversion to market prices	Error! Objects cannot be created from editing field codes.Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.

See Section 4.4.5 for a discussion about why operator toll revenues and user charge disbenefits are not of the same size and do not cancel each other out.

#### v. Indirect tax revenues

The formula used for work trips is:

$$\text{taxrevenue} = \left( T^1 F_{\text{petrol}}^1 - T^0 F_{\text{petrol}}^0 \right) (1+t) t'_{\text{petrol}} + \\ \left( T^1 F_{\text{diesel}}^1 - T^0 F_{\text{diesel}}^0 \right) (1+t) t'_{\text{diesel}} + \\ \left( T^1 M_{\text{fare}}^1 - T^0 M_{\text{fare}}^0 \right) (1+t) t'_{\text{fare}} + \\ \left( T^1 M_{\text{toll}}^1 - T^0 M_{\text{toll}}^0 \right) (1+t) t'_{\text{toll}} + \\ \left( T^1 N^1 - T^0 N^0 \right) (1+t) t'_{\text{nonfuel}}$$

The formula used for non-work trips is:

$$\text{taxrevenue} = \left( T^1 F_{\text{petrol}}^1 - T^0 F_{\text{petrol}}^0 \right) (t_{\text{petrol}} - t) + \\ \left( T^1 F_{\text{diesel}}^1 - T^0 F_{\text{diesel}}^0 \right) (t_{\text{diesel}} - t) + \\ \left( T^1 M_{\text{fare}}^1 - T^0 M_{\text{fare}}^0 \right) (t_{\text{fare}} - t) + \\ \left( T^1 M_{\text{toll}}^1 - T^0 M_{\text{toll}}^0 \right) (t_{\text{toll}} - t) + \\ \left( T^1 N^1 - T^0 N^0 \right) (t_{\text{nonfuel}} - t)$$

Note that there are some key differences from WebTAG in the TUBA formula for the following reasons:

- In TUBA the quantities F, M, N are in resource costs therefore the divisor in the WebTAG formula to recover resource costs from perceived costs is not needed
- TUBA deals with petrol and diesel costs separately because of the different levels of duty

It can be seen from the formulae that it is necessary to include the change in expenditure for fuel and non-fuel vehicle operating costs. The first step is the calculation of 2025 fuel prices and tax rates using the data in the standard economics file (consistent with WebTAG). These are given below (details of calculation not given):

**Table 4.13: 2025 fuel costs and tax rates (2002 prices)**

	Petrol	Diesel
Resource cost (p/litre)	36.63	40.29
Duty (p/litre)	52.69	52.69
VAT (%)	20.0	20.0
Intermediate tax rate (%)	144	131

	Petrol	Diesel
Final tax rate (%)	193	177

Fuel consumption per trip in DM and DS and total expenditure on fuel are calculated using the standard economics file fuel consumption coefficients and allowing for efficiency gains and the change in the petrol/diesel split (details not given):

**Table 4.14:** 2025 fuel consumption and expenditure

User class	1	6
DM petrol consumption per trip (litres) (2002 fuel consumption levels)	0.76	0.76
DS petrol consumption per trip (litres) (2002 fuel consumption levels)	0.71	0.71
DM total expenditure on petrol ( $T^0 F_{\text{petrol}}^0$ , hourly rate resource costs, £)	9.24	13.23
DS total expenditure on petrol ( $T^1 F_{\text{petrol}}^1$ hourly rate resource costs, £)	8.52	9.39
DM diesel consumption per trip (litres) (2002 fuel consumption levels)	0.64	0.64
DS diesel consumption per trip (litres) (2002 fuel consumption levels)	0.59	0.59
DM total expenditure on diesel ( $T^0 F_{\text{diesel}}^0$ hourly rate resource costs, £)	7.99	11.44
DS total expenditure on diesel ( $T^1 F_{\text{diesel}}^1$ hourly rate resource costs, £)	7.35	8.10

Note that the total expenditure values include the application of fuel efficiency gains between 2002 and 2025.

Total non-fuel VOC expenditure in the DM and DS for user class 6 is given below (for the indirect tax calculation it is not needed for user class 1 as work trips do not pay tax on non-fuel VOC):

**Table 4.15:** 2025 Non—fuel VOC expenditure for non-work car trips (resource costs, hourly rate, £s)

DM Non fuel VOC expenditure	44.09
DS Non fuel VOC expenditure	33.61
Difference (DS DM)	-10.47

Note that non-work VOC per trip depends on distance only. The drop in expenditure is caused by the drop in the number of trips.

The calculations for indirect tax revenue are then as follows:

**Table 4.16:** Indirect tax revenue calculations

User class	1	6	8	10
Indirect tax revenue (hourly rate, £)	Error! Objects cannot be created from editing field codes.	$(9.39 - 13.23)(1.93 - 0.209) + (8.10 - 11.44)(1.77 - 0.209) + 220(0 - 0.209) + (-10.47)(0.20 - 0.209) = -57.74$	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.
Annualisation and discounting	Error! Objects cannot be created from editing field codes.	$\times 126.5 \times \frac{1}{(1.035)^{(2025-2002)}} = -3311$	Error! Objects cannot be created from editing field codes.	Error! Objects cannot be created from editing field codes.

Note that because the intermediate tax rates on fares, tolls and non-fuel VOC are zero, only the change in fuel expenditure is included for work purposes. Only fare expenditure is used for user class 10. Figures for the change in expenditure on charges have been taken from the first row of Table 4.11.

## vi. Summary

The above sections have shown the step by step calculations used by TUBA in the calculation of selected benefits and revenues. This should help explain the sometimes counter-intuitive results obtained from road pricing examples and to demonstrate that the results are consistent with the formulae given in WebTAG Unit 3.5.3<sup>9</sup>.

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<sup>9</sup> <http://www.dft.gov.uk/webtag/documents/expert/unit3.5.3.php>

# Appendices

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## Appendix A. Scheme Files

### A.1. Example 1

SCHEME SPECIFIC PARAMETERS

```
PARAMETERS
TUBA_version      1.9
run_name          Example 1
do_min_name       Do nothing
do_som_name        Bypass
first_yr          2015
horizon_yr        2074
modelled_yrs      2015 2030
detail            Yes
current_yr        2010
print_warn         10
P&R_car_speed     65.0
zones_as_sectors  No
```

TIME\_SLICES

*no.	duration(min)	annualisation	period	description
1	30	253	1	0700-0730
2	30	253	1	0730-0800
3	30	253	1	0800-0830
4	30	253	1	0830-0900
5	30	253	1	0900-0930
6	30	253	1	0930-1000
7	360	253	3	1000-1600
8	30	253	2	1600-1630
9	30	253	2	1630-1700
10	30	253	2	1700-1730
11	30	253	2	1730-1800
12	30	253	2	1800-1830
13	30	253	2	1830-1900

SCHEMES\_DM

*Mode	1st Construction year	Opening_yr	Stage
-------	-----------------------	------------	-------

DO\_MIN\_COSTS

*Type	Mode	Funding	Cost	Price	RPI
-------	------	---------	------	-------	-----

DO\_MIN\_PROFILE

*Year	Mode	%Const	%Land	%Prep	%Super	%Maint	%Op	%Grant	%Dev
-------	------	--------	-------	-------	--------	--------	-----	--------	------

DO\_MIN\_DELAY\_COSTS

*Year	Mode	Business	Commuting	Other	Freight
-------	------	----------	-----------	-------	---------

```

SCHEMES_DS
*Mode 1st Construction year      Opening_yr      Stage
    1        2013                  2015          OP

DO_SOM_COSTS
*Type   Mode   Funding     Cost      Price      RPI
    C       1      cen     30000.0    F        214.0
    L       1      cen     30000.0    F        214.0
    P       1      cen     default
    S       1      cen     default

DO_SOM_PROFILE
*Year  Mode   %Const     %Land     %Prep     %Super     %Maint     %Op      %Grant     %Dev
  2008   1      25.0     -1.0     -1.0      0.0       0.0       0.0       0.0       0.0
  2009   1      50.0     -1.0     -1.0      0.0       0.0       0.0       0.0       0.0
  2010   1      25.0     -1.0     -1.0      0.0       0.0       0.0       0.0       0.0

DO_SOM_DELAY_COSTS
*Year  Mode   Business     Commuting     Other      Freight
  2013   1      25.0      100.0       0.0       25.0
  2014   1      50.0      200.0       0.0       50.0
  2015   1      25.0      100.0       0.0       25.0

BENEFIT_CHANGE
*% change p.a.
*Start_yr  End_yr  Submode ChangePer1 ChangePer2 ChangePer3 ChangePer4 ChangePer5

USER_CLASSES
*no.      Veh/submode     purpose     person_type
  1           1             1            0
  2           3             0            0
  3           4             0            0
  4           6             1            1
  5           1             2            0
  6           6             2            2
  7           6             1            2
  8           1             3            0
  9           6             3            2

INPUT_MATRICES
*no.      userclasses     timeslice     type      format  scenario year   factor   filename
  1       1-5;8           1-13         V         3        0       2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP.DAT
  2       1-5;8           1-13         V         3        1       2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP.DAT
  3       1-5;8           1-13         V         3        0       2030  1.00000  c:\TUBAdemo\matrices\2030_dn_HW_TRIP.DAT
  4       1-5;8           1-13         V         3        1       2030  1.00000  c:\TUBAdemo\matrices\2030_RS_HW_TRIP.DAT

```

## TUBA Demonstration Examples



5	1-5;8	1-13	D	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_DN_HW_dist.DAT
6	1-5;8	1-13	D	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_RS_HW_dist.DAT
7	1-5;8	1-13	D	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_HW_dist.DAT
8	1-5;8	1-13	D	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_RS_HW_dist.DAT
9	1-5;8	1-13	T	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_DN_HW_Time.DAT
10	1-5;8	1-13	T	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_RS_HW_Time.DAT
11	1-5;8	1-13	T	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_HW_Time.DAT
12	1-5;8	1-13	T	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_RS_HW_Time.DAT
13	6;9	1-13	P	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_NWK.PRN
14	6;9	1-13	P	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_rs_PT_TRIPS_NWK.PRN
15	6;9	1-13	P	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_NWK.PRN
16	6;9	1-13	P	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_rs_PT_TRIPS_NWK.PRN
17	6;9	1-13	T	3	0	2015	0.01670	c:\TUBAdemo\matrices\2015_dn_PT_Times_NWK.PRN
18	6;9	1-13	T	3	1	2015	0.01670	c:\TUBAdemo\matrices\2015_rs_PT_Times_NWK.PRN
19	6;9	1-13	T	3	0	2030	0.01670	c:\TUBAdemo\matrices\2030_dn_PT_Times_NWK.PRN
20	6;9	1-13	T	3	1	2030	0.01670	c:\TUBAdemo\matrices\2030_rs_PT_Times_nWK.PRN
21	7	1-13	P	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_WK.PRN
22	7	1-13	P	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_WK.PRN
23	7	1-13	P	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_WK.PRN
24	7	1-13	P	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_WK.PRN
25	7	1-13	T	3	0	2015	0.01670	c:\TUBAdemo\matrices\2015_dn_PT_Times_WK.PRN
26	7	1-13	T	3	1	2015	0.01670	c:\TUBAdemo\matrices\2015_rs_PT_Times_WK.PRN
27	7	1-13	T	3	0	2030	0.01670	c:\TUBAdemo\matrices\2030_dn_PT_Times_WK.PRN
28	7	1-13	T	3	1	2030	0.01670	c:\TUBAdemo\matrices\2030_rs_PT_Times_WK.PRN
29	6-7;9	1-13	C1	3	0	2015	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
30	6-7;9	1-13	C1	3	1	2015	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
31	6-7;9	1-13	C1	3	0	2030	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
32	6-7;9	1-13	C1	3	1	2030	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn

### SECTORS

\*mode Sector\_file\_name

## A.2. Example 2

SCHEME SPECIFIC PARAMETERS

```
PARAMETERS
TUBA_version      1.9
run_name          Example 2
do_min_name       Do nothing
do_som_name        Bus scheme
first_yr           2015
horizon_yr         2074
modelled_yrs      2015 2030
detail             Yes
current_yr         2010
print_warn          10
P&R_car_speed     65.0
zones_as_sectors  No
```

TIME\_SLICES

*no.	duration(min)	annualisation	period	description
1	30	253	1	0700-0730
2	30	253	1	0730-0800
3	30	253	1	0800-0830
4	30	253	1	0830-0900
5	30	253	1	0900-0930
6	30	253	1	0930-1000
7	360	253	3	1000-1600
8	30	253	2	1600-1630
9	30	253	2	1630-1700
10	30	253	2	1700-1730
11	30	253	2	1730-1800
12	30	253	2	1800-1830
13	30	253	2	1830-1900

SCHEMES\_DM

*Mode	1st Construction year	Opening_yr	Stage
-------	-----------------------	------------	-------

DO\_MIN\_COSTS

*Type	Mode	Funding	Cost	Price	RPI
-------	------	---------	------	-------	-----

DO\_MIN\_PROFILE

*Year	Mode	%Const	%Land	%Prep	%Super	%Maint	%Op	%Grant	%Dev
-------	------	--------	-------	-------	--------	--------	-----	--------	------

DO\_MIN\_DELAY\_COSTS

*Year	Mode	Business	Commuting	Other	Freight
-------	------	----------	-----------	-------	---------

## TUBA Demonstration Examples



```

SCHEMES_DS
*Mode 1st Construction year      Opening_yr      Stage
  1    2014                      2015          SI
  2    2014                      2015          SI

DO_SOM_COSTS
*Type   Mode   Funding       Cost        Price       RPI
  C     1     loc      5000.0      F      214.0
  L     1     loc      500.0       F      214.0
  O     2     pri     1500.0      F      214.0
  G     2     loc      100.0       F      214.0
  P     1     loc    default
  S     1     loc    default

DO_SOM_PROFILE
*Year  Mode   %Const      %Land      %Prep      %Super      %Maint      %Op       %Grant      %Dev
  2011  1     50.0      -1.0      -1.0       0.0      -1.0       0.0       0.0
  2015  1     50.0      -1.0      -1.0       0.0      -1.0       0.0       0.0
  2011  2     0.0      -1.0      -1.0       0.0      -1.0       0.0       0.0
  2015  2     0.0      -1.0      -1.0       0.0      -1.0      100.0      0.0

DO_SOM_DELAY_COSTS
*Year  Mode   Business      Commuting      Other      Freight

BENEFIT_CHANGE
*% change p.a.
*Start_yr  End_yr  Submode ChangePer1 ChangePer2 ChangePer3 ChangePer4 ChangePer5

USER_CLASSES
*no.    Veh/submode      purpose      person_type
  1        1              1            0
  2        3              0            0
  3        4              0            0
  4        6              1            1
  5        1              2            0
  6        6              2            2
  7        6              1            2

INPUT_MATRICES
*no.    userclasses      timeslice      type      format      scenario      year      factor      filename
  1    1-5                1-13        V         3          0        2015    1.00000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP.DAT
  2    1-5                1-13        V         3          1        2015    1.00000  c:\TUBAdemo\matrices\2015_b1_HW_TRIP.DAT
  3    1-5                1-13        V         3          0        2030    1.00000  c:\TUBAdemo\matrices\2030_dn_HW_TRIP.DAT
  4    1-5                1-13        V         3          1        2030    1.00000  c:\TUBAdemo\matrices\2030_b1_HW_TRIP.DAT
  5    1-5                1-13        D         3          0        2015    1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist.DAT
  6    1-5                1-13        D         3          1        2015    1.00000  c:\TUBAdemo\matrices\2015_b1_HW_dist.DAT
  7    1-5                1-13        D         3          0        2030    1.00000  c:\TUBAdemo\matrices\2030_dn_HW_dist.DAT
  8    1-5                1-13        D         3          1        2030    1.00000  c:\TUBAdemo\matrices\2030_b1_HW_dist.DAT

```

## TUBA Demonstration Examples



9	1-5	1-13	T	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_HW_Time.DAT
10	1-5	1-13	T	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_b1_HW_Time.DAT
11	1-5	1-13	T	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_HW_Time.DAT
12	1-5	1-13	T	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_b1_HW_Time.DAT
13	6	1-13	P	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_NWK.PRN
14	6	1-13	P	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_b1_PT_TRIPS_NWK.PRN
15	6	1-13	P	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_NWK.PRN
16	6	1-13	P	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_b1_PT_TRIPS_NWK.PRN
17	6	1-13	T	3	0	2015	0.01670	c:\TUBAdemo\matrices\2015_dn_PT_Times_NWK.PRN
18	6	1-13	T	3	1	2015	0.01670	c:\TUBAdemo\matrices\2015_b1_PT_Times_NWK.PRN
19	6	1-13	T	3	0	2030	0.01670	c:\TUBAdemo\matrices\2030_dn_PT_Times_NWK.PRN
20	6	1-13	T	3	1	2030	0.01670	c:\TUBAdemo\matrices\2030_b1_PT_Times_nWK.PRN
21	7	1-13	P	3	0	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_WK.PRN
22	7	1-13	P	3	1	2015	1.00000	c:\TUBAdemo\matrices\2015_dn_PT_TRIPS_WK.PRN
23	7	1-13	P	3	0	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_WK.PRN
24	7	1-13	P	3	1	2030	1.00000	c:\TUBAdemo\matrices\2030_dn_PT_TRIPS_WK.PRN
25	7	1-13	T	3	0	2015	0.01670	c:\TUBAdemo\matrices\2015_dn_PT_Times_WK.PRN
26	7	1-13	T	3	1	2015	0.01670	c:\TUBAdemo\matrices\2015_b1_PT_Times_WK.PRN
27	7	1-13	T	3	0	2030	0.01670	c:\TUBAdemo\matrices\2030_dn_PT_Times_WK.PRN
28	7	1-13	T	3	1	2030	0.01670	c:\TUBAdemo\matrices\2030_b1_PT_Times_WK.PRN
29	6-7	1-13	C1	3	0	2015	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
30	6-7	1-13	C1	3	1	2015	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
31	6-7	1-13	C1	3	0	2030	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn
32	6-7	1-13	C1	3	1	2030	1.00000	c:\TUBAdemo\matrices\all_yrs_pt_fares.prn

SECTORS

\*mode Sector\_file\_name

### A.3. Example 3

SCHEME SPECIFIC PARAMETERS

```

PARAMETERS
TUBA_version      1.9
run_name          Example 3 demonstrates splitting
do_min_name       Do nothing
do_som_name        Bypass
first_yr           2015
horizon_yr         2015
modelled_yrs       2015
detail             Yes
current_yr         2010
print_warn          10
P&R_car_speed     65.0
zones_as_sectors   No

TIME_SLICES
*no.      duration(min)      annualisation      period      description
  1          30                  253                  1            0700-0730

SCHEMES_DM
*Mode 1st Construction year      Opening_yr      Stage

DO_MIN_COSTS
*Type Mode Funding      Cost      Price      RPI

DO_MIN_PROFILE
*Year Mode %Const      %Land      %Prep      %Super      %Maint      %Op      %Grant      %Dev

DO_MIN_DELAY_COSTS
*Year Mode Business      Commuting      Other      Freight

SCHEMES_DS
*Mode 1st Construction year      Opening_yr      Stage
  1          2013                  2015              OP

DO_SOM_COSTS
*Type Mode Funding      Cost      Price      RPI      RPF
  C      1    cen      30000.0      F      214.0      1.02
  L      1    cen      3000.0       F      214.0      1.00
  P      1    cen      default
  S      1    cen      default

DO_SOM_PROFILE
*Year Mode %Const      %Land      %Prep      %Super      %Maint      %Op      %Grant      %Dev
  2013    1      25.0      -1.0      -1.0      -1.0      0.0      0.0      0.0

```

## TUBA Demonstration Examples



```

2014    1      50.0     -1.0     -1.0     -1.0      0.0      0.0      0.0      0.0
2015    1      25.0    -1.0     -1.0     -1.0      0.0      0.0      0.0      0.0

DO_SOM_DELAY_COSTS
*Year Mode Business   Commuting   Other   Freight
2013  1    25.0    100.0      0.0     25.0
2014  1    50.0    200.0      0.0     50.0
2015  1    25.0    100.0      0.0     25.0

BENEFIT_CHANGE
*% change p.a.
*Start_yr End_yr Submode ChangePer1 ChangePer2 ChangePer3 ChangePer4 ChangePer5

USER_CLASSES
*no. Veh/submode purpose person_type
  1       1        0        0
  2       3        0        0
  3       4        0        0
  4       6        1        1
  5       2        0        0
  6       5        0        0
  7       6        0        2

INPUT_MATRICES
*no. userclasses timeslice type format scenario year factor filename
  1       1          1      V      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP1.csv
  2       1          1      V      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP1.csv
  3       1          1      D      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist1.csv
  4       1          1      D      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_dist1.csv
  5       1          1      T      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_Time1.csv
  6       1          1      T      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_Time1.csv
  7       2          1      V      2      0    2015  0.72000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP2.csv
  8       2          1      V      2      1    2015  0.72000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP2.csv
  9       2          1      D      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist2.csv
 10      2          1      D      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_dist2.csv
 11      2          1      T      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_Time2.csv
 12      2          1      T      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_Time2.csv
 13      3          1      V      2      0    2015  0.60000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP3.csv
 14      3          1      V      2      1    2015  0.60000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP3.csv
 15      3          1      D      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist3.csv
 16      3          1      D      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_dist3.csv
 17      3          1      T      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_Time3.csv
 18      3          1      T      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_Time3.csv
 19      4          1      V      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP4.csv
 20      4          1      V      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP4.csv
 21      4          1      D      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist4.csv
 22      4          1      D      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_dist4.csv
 23      4          1      T      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_Time4.csv
 24      4          1      T      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_Time4.csv
 25      5          1      V      2      0    2015  0.28000  c:\TUBAdemo\matrices\2015_DN_HW_TRIP2.csv
 26      5          1      V      2      1    2015  0.28000  c:\TUBAdemo\matrices\2015_RS_HW_TRIP2.csv
 27      5          1      D      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_dist2.csv
 28      5          1      D      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_dist2.csv
 29      5          1      T      2      0    2015  1.00000  c:\TUBAdemo\matrices\2015_DN_HW_Time2.csv
 30      5          1      T      2      1    2015  1.00000  c:\TUBAdemo\matrices\2015_RS_HW_Time2.csv

```

## TUBA Demonstration Examples



31	6	1	V	2	0	2015	0.40000	c:\TUBAdemo\matrices\2015_DN_HW_TRIP3.csv
32	6	1	V	2	1	2015	0.40000	c:\TUBAdemo\matrices\2015_RS_HW_TRIP3.csv
33	6	1	D	2	0	2015	1.00000	c:\TUBAdemo\matrices\2015_DN_HW_dist3.csv
34	6	1	D	2	1	2015	1.00000	c:\TUBAdemo\matrices\2015_RS_HW_dist3.csv
35	6	1	T	2	0	2015	1.00000	c:\TUBAdemo\matrices\2015_DN_HW_Time3.csv
36	6	1	T	2	1	2015	1.00000	c:\TUBAdemo\matrices\2015_RS_HW_Time3.csv
37	7	1	P	2	0	2015	12.20000	c:\TUBAdemo\matrices\2015_DN_HW_TRIP4.csv
38	7	1	P	2	1	2015	12.20000	c:\TUBAdemo\matrices\2015_RS_HW_TRIP4.csv
39	7	1	T	2	0	2015	1.00000	c:\TUBAdemo\matrices\2015_DN_HW_Time4.csv
40	7	1	T	2	1	2015	1.00000	c:\TUBAdemo\matrices\2015_RS_HW_Time4.csv

### SECTORS

\*mode Sector\_file\_name

#### **A.4. Example 4**

```

SCHEME SPECIFIC PARAMETERS

PARAMETERS
TUBA_version      1.8
run_name          Example 4
do_min_name       Do nothing
do_som_name        Bypass
first_yr           2025
horizon_yr         2025
modelled_yrs      2025
detail             Yes
current_yr         2010
print_warn         10
P&R_car_speed     65.0
zones_as_sectors  Yes

TIME_SLICES
*no.    duration(min)    annualisation    period    description
  1      30                253              1          0700-0730
  2      30                253              1          0730-0800
  3      30                253              1          0800-0830
  4      30                253              1          0830-0900
  5      30                253              1          0900-0930
  6      30                253              1          0930-1000
  7      360               253              3          1000-1600
  8      30                253              2          1600-1630
  9      30                253              2          1630-1700
 10     30                253              2          1700-1730
 11     30                253              2          1730-1800
 12     30                253              2          1800-1830
 13     30                253              2          1830-1900

SCHEMES_DM
*Mode  1st Construction year      Opening_yr      Stage

DO_MIN_COSTS
*Type   Mode   Funding      Cost      Price      RPI

DO_MIN_PROFILE
*Year   Mode   %Const      %Land      %Prep      %Super      %Maint      %Op      %Grant      %Dev

```

## TUBA Demonstration Examples



```

DO_MIN_DELAY_COSTS
*Year Mode Business Commuting Other Freight

SCHEMES_DS
*Mode 1st Construction year Opening_yr Stage

DO_SOM_COSTS
*Type Mode Funding Cost Price RPI

DO_SOM_PROFILE
*Year Mode %Const %Land %Prep %Super %Maint %Op %Grant %Dev

DO_SOM_DELAY_COSTS
*Year Mode Business Commuting Other Freight

BENEFIT_CHANGE
*% change p.a.
*Start_yr End_yr Submode ChangePer1 ChangePer2 ChangePer3 ChangePer4 ChangePer5

USER_CLASSES
*no. Veh/submode purpose person_type
    1      1        1       0
    2      3        1       0
    3      4        1       0
    4      6        1       1
    5      1        2       0
    6      1        3       0
    7      1        4       0
    8      6        1       2
    9      6        2       2
   10     6        3       2
   11     6        4       2

INPUT_MATRICES
*no. userclasses timeslice type format scenario year factor filename
    1    1-7          1-13   V      3        0    2025  1.00000 C:\TUBAdemo\matrices\2025DM_trip.dat
    2    1-7          1-13   V      3        1    2025  1.00000 C:\TUBAdemo\matrices\2025DSTOLL_trip.dat
    3    1-7          1-13   D      3        0    2025  1.00000 C:\TUBAdemo\matrices\2025DM_dist.dat
    4    1-7          1-13   D      3        1    2025  1.00000 C:\TUBAdemo\matrices\2025DSTOLL_dist.dat
    5    1-7          1-13   T      3        0    2025  1.00000 C:\TUBAdemo\matrices\2025DM_time.dat
    6    1-7          1-13   T      3        1    2025  1.00000 C:\TUBAdemo\matrices\2025DSTOLL_time.dat
    7    1-7          1-13   C3     3        0    2025 100.00000 C:\TUBAdemo\matrices\2025DM_toll.dat
    8    1-7          1-13   C3     3        1    2025 100.00000 C:\TUBAdemo\matrices\2025DSTOLL_toll.dat
*
    9    8            1-13   P      3        0    2025  1.00000 C:\TUBAdemo\matrices\2025_DM_PT_WK.prn
   10   8            1-13   P      3        1    2025  1.00000 C:\TUBAdemo\matrices\2025_DS2Pds_PT_WK.prn
   11   8            1-13   T      3        0    2025  0.01670 C:\TUBAdemo\matrices\2025_dm_pt_times_wk.prn

```

## TUBA Demonstration Examples



*	12	8	1-13	T	3	1	2025	0.01670	C:\TUBAdemo\matrices\2025_DS_pt_times_wk.prn
*	13	9-11	1-13	P	3	0	2025	1.00000	C:\TUBAdemo\matrices\2025_DM_PT_NWK.prn
14	9-11	1-13	P	3	1	2025	1.00000	C:\TUBAdemo\matrices\2025_DS2Pds_PT_NWK.prn	
15	9-11	1-13	T	3	0	2025	0.01670	C:\TUBAdemo\matrices\2025_dm_pt_times_nwk.prn	
16	9-11	1-13	T	3	1	2025	0.01670	C:\TUBAdemo\matrices\2025_DS_pt_times_nwk.prn	
*	17	8-11	1-13	C1	3	0	2025	1.00000	C:\TUBAdemo\matrices\all_yrs_PT_fares_example4.prn
*	18	8-11	1-13	C1	3	1	2025	1.00000	C:\TUBAdemo\matrices\all_yrs_PT_fares_example4.prn

### SECTORS

\*mode Sector\_file\_name

## Appendix B. Example 4 Economics File

TUBA ECONOMIC PARAMETERS FILE (14/08/2012) Consistent with May 2012 version of WebTAG 3.5.6 and 3.3.5

### PARAMETERS

TUBA_version	1.9	the current version of TUBA
base_year	2010	defines base year for economic parameters
pres_val_year	2010	present value year for discounting
RPI_base	223.6	value of RPI in base year
av_ind_tax	20.9	% average final indirect tax rate
nt_carbonvalues	26.79 80.37 53.58	base year non-traded carbon values in £/tonne (low high central)
t_carbonvalues	12.41 12.41 12.41	base year traded carbon values in £/tonne (low high central)

### MODES

*no.	description
1	Road
2	Bus
3	Rail

### VEHICLE\_TYPE/SUBMODE

*no.	mode	new_mode	P&R	type	description
1	1	N	N	per	Car

2	1	N	N	per	LGV Personal
3	1	N	N	fre	LGV Freight
4	1	N	N	fre	OGV1
5	1	N	N	fre	OGV2
6	2	N	N	per	Bus
7	3	N	N	per	Light Rail
8	3	N	N	per	Heavy rail

## PERSON\_TYPE

*no.	type(D/P)	description
1	D	Driver
2	P	Passenger

## PURPOSE

*no.	type(B/C/O)	description
1	B	Business
2	C	Commuting
3	O	Other

## FUEL\_TYPE

*no.	sector	name	(sector: 1=untraded sector 2=traded sector)
1	1	petrol	
2	1	diesel	
3	2	Electric	

## TIME\_PERIODS

*no.	description	comments
1	AM peak	(7-10 weekdays)

## TUBA Demonstration Examples



2	PM peak	(4-7 weekdays)
3	Inter-peak	(10-4 weekdays)
4	Off-peak	(7-7 weekdays)
5	Weekend	(weekend)

### BREAKPOINTS

*description	breakpoint1	breakpoint2	..				
Distance	1.0	5.0	10.0	15.0	20.0	50.0	100.0
TimeSaving	-5.0	-2.0	0.0	2.0	5.0		

### CHARGES

*no.	sector	description
1	pri	PT fares (private operators)
2	loc	PT fares (LA operated)
3	loc	LA tolls
4	cen	National tolls
5	pri	Private tolls
6	loc	LA on-street parking
7	loc	LA off-street parking
8	pri	Private parking

### DISCOUNT\_RATE

\*% change p.a.

*Start_yr	End_yr	Rate
1	30	3.50
31	75	3.00
76	80	2.50

## VALUE\_OF\_TIME

\*pence per hour (in base year values and prices)

\*Vtype/submode Person\_type VOT\_purpose1 VOT\_purpose2..

1	1	2835	646	571
1	2	2031	646	571
2	1	1092	646	571
2	2	1092	646	571
3	1	1092	0	0
3	2	1092	0	0
4	1	1092	0	0
4	2	1092	0	0
5	1	1092	0	0
5	2	1092	0	0
6	1	1092	0	0
6	2	2169	646	571
7	1	0	0	0
7	2	3965	646	571
8	1	0	0	0
8	2	3965	646	571

## VALUE\_OF\_TIME\_GROWTH

\*% change p.a.

\*Start\_yr End\_yr VOT\_Gr\_purpose1 VOT\_Gr\_purpose2 ..

Start_yr	End_yr	VOT_Gr_purpose1	VOT_Gr_purpose2	..
2011	2011	-0.1	-0.08	-0.08
2012	2012	0.09	0.07	0.07
2013	2013	1.28	1.02	1.02

## TUBA Demonstration Examples



2014	2014	1.98	1.58	1.58
2015	2015	2.3	1.84	1.84
2016	2016	2.33	1.86	1.86
2017	2017	2.13	1.7	1.7
2018	2018	1.63	1.3	1.3
2019	2019	1.64	1.31	1.31
2020	2020	1.64	1.31	1.31
2021	2021	1.85	1.48	1.48
2022	2022	1.76	1.41	1.41
2023	2023	1.77	1.42	1.42
2024	2024	1.89	1.51	1.51
2025	2025	1.8	1.44	1.44
2026	2026	1.82	1.45	1.45
2027	2027	1.83	1.46	1.46
2028	2028	1.85	1.48	1.48
2029	2029	1.87	1.49	1.49
2030	2030	1.88	1.5	1.5
2031	2031	1.9	1.52	1.52
2032	2032	1.91	1.53	1.53
2033	2033	2.03	1.62	1.62
2034	2034	2.15	1.72	1.72
2035	2035	2.15	1.72	1.72
2036	2036	2.15	1.72	1.72
2037	2037	2.08	1.66	1.66
2038	2038	2.08	1.66	1.66
2039	2039	2.08	1.66	1.66
2040	2040	2.18	1.74	1.74
2041	2041	2.18	1.74	1.74
2042	2042	2.21	1.76	1.76

## TUBA Demonstration Examples



2043	2043	2.31	1.84	1.84
2044	2044	2.31	1.84	1.84
2045	2045	2.21	1.76	1.76
2046	2046	2.21	1.76	1.76
2047	2047	2.14	1.71	1.71
2048	2048	2.14	1.71	1.71
2049	2049	2.14	1.71	1.71
2050	2050	2.14	1.71	1.71
2051	2051	2.04	1.63	1.63
2052	2052	2.07	1.65	1.65
2053	2053	2.07	1.65	1.65
2054	2054	2.07	1.65	1.65
2055	2055	2.07	1.65	1.65
2056	2056	2.07	1.65	1.65
2057	2057	2.08	1.66	1.66
2058	2058	2.08	1.66	1.66
2059	2059	2.09	1.67	1.67
2060	2060	2.09	1.67	1.67
2061	2100	2.17	1.73	1.73

### AV\_IND\_TAX\_CHANGES

\*% change p.a.

*Start_yr	End_yr	Growth
2011	2050	0.00

### CHARGE\_TAX\_RATES

\*% base year tax rates

*charge	final	intermediate
1	0.0	0.0

## TUBA Demonstration Examples



2	0.0	0.0
3	0.0	0.0
4	0.0	0.0
5	17.5	0.0
6	0.0	0.0
7	17.5	0.0
8	17.5	0.0

### CHARGE\_TAX\_RATES\_CHANGES

\*% change p.a.

*Start_yr	End_yr	charge	final	intermediate
2011	2011	1	0	0
2011	2011	2	0	0
2011	2011	3	0	0
2011	2011	4	0	0
2011	2011	5	14.29	0
2011	2011	6	0	0
2011	2011	7	14.29	0
2011	2011	8	14.29	0
2012	2100	1	0	0
2012	2100	2	0	0
2012	2100	3	0	0
2012	2100	4	0	0
2012	2100	5	0	0
2012	2100	6	0	0
2012	2100	7	0	0
2012	2100	8	0	0

## FUEL\_COST

\* This is in base year values and prices

	*type	resource(p/unit)	duty(p/unit)	VAT(%)	carbon_grammes/unit	(unit=litre for fuel types 1 & 2; unit=KWH for electric)
1		42.57	57.19	17.5	608.65	
2		44.31	57.19	17.5	691.06	
3		12.35	0	5	101.86	

## FUEL\_COST\_CHANGES

\*% change p.a.

	*Start_yr	End_yr	fuel_type	Resource	duty	VAT	Carbon_Density_Change
2011	2011	1		22.03	-0.52	14.29	-0.85
2012	2012	1		3.21	-0.74	0.00	-0.52
2013	2013	1		0.95	2.64	0.00	-0.52
2014	2014	1		0.96	0.00	0.00	-1.04
2015	2015	1		0.97	1.07	0.00	-1.06
2016	2016	1		0.96	1.47	0.00	-1.06
2017	2017	1		0.97	1.21	0.00	-1.07
2018	2018	1		0.96	0.95	0.00	-1.09
2019	2019	1		0.97	0.71	0.00	-1.10
2020	2020	1		0.98	0.46	0.00	-1.11
2021	2021	1		0.97	0.20	0.00	0.00
2022	2022	1		0.96	0.19	0.00	0.00
2023	2023	1		0.97	0.19	0.00	0.00
2024	2024	1		0.97	0.19	0.00	0.00
2025	2025	1		0.96	0.19	0.00	0.00
2026	2026	1		0.97	0.19	0.00	0.00
2027	2027	1		0.98	0.19	0.00	0.00

## TUBA Demonstration Examples



2028	2028	1	0.97	0.19	0.00	0.00
2029	2029	1	0.98	0.19	0.00	0.00
2030	2030	1	0.97	0.21	0.00	0.00
2031	2100	1	0.00	0.00	0.00	0.00
2011	2011	2	26.63	-0.52	14.29	0.19
2012	2012	2	6.29	-0.74	0.00	-0.52
2013	2013	2	0.96	2.64	0.00	-0.52
2014	2014	2	0.95	0.00	0.00	-0.57
2015	2015	2	0.95	1.07	0.00	-0.56
2016	2016	2	0.96	1.47	0.00	-0.57
2017	2017	2	0.95	1.21	0.00	-0.57
2018	2018	2	0.96	0.95	0.00	-0.58
2019	2019	2	0.95	0.71	0.00	-0.58
2020	2020	2	0.96	0.46	0.00	-0.58
2021	2021	2	0.96	0.20	0.00	0.00
2022	2022	2	0.95	0.19	0.00	0.00
2023	2023	2	0.96	0.19	0.00	0.00
2024	2024	2	0.95	0.19	0.00	0.00
2025	2025	2	0.97	0.19	0.00	0.00
2026	2026	2	0.96	0.19	0.00	0.00
2027	2027	2	0.95	0.19	0.00	0.00
2028	2028	2	0.97	0.19	0.00	0.00
2029	2029	2	0.96	0.19	0.00	0.00
2030	2030	2	0.96	0.21	0.00	0.00
2031	2100	2	0.00	0.00	0.00	0.00
2011	2011	3	11.58	0.00	0.00	0.00
2012	2012	3	7.26	0.00	0.00	0.00
2013	2013	3	5.28	0.00	0.00	0.00
2014	2014	3	3.15	0.00	0.00	0.00

## TUBA Demonstration Examples



2015	2015	3	0.93	0.00	0.00	0.00
2016	2016	3	3.33	0.00	0.00	0.00
2017	2017	3	1.73	0.00	0.00	0.00
2018	2018	3	-1.47	0.00	0.00	0.00
2019	2019	3	3.10	0.00	0.00	0.00
2020	2020	3	3.82	0.00	0.00	0.00
2021	2021	3	3.12	0.00	0.00	0.00
2022	2022	3	1.40	0.00	0.00	0.00
2023	2023	3	0.05	0.00	0.00	0.00
2024	2024	3	2.55	0.00	0.00	0.00
2025	2025	3	2.44	0.00	0.00	0.00
2026	2026	3	0.91	0.00	0.00	-6.02
2027	2027	3	2.01	0.00	0.00	-6.38
2028	2028	3	0.64	0.00	0.00	-6.85
2029	2029	3	-0.54	0.00	0.00	-7.35
2030	2030	3	1.28	0.00	0.00	-7.90
2031	2100	3	0.00	0.00	0.00	-8.61

### CARBON\_VALUE\_CHANGES

*Start_yr	End_yr	Rel. (%) - non-traded	Abs. - non-traded (£/tonne/year)	Rel. (%) - traded	Abs. (£/tonne/year) - traded
2011	2011	1.51	0.00	6.04	0.00
2012	2012	1.49	0.00	7.67	0.00
2013	2013	1.50	0.00	9.67	0.00
2014	2014	1.50	0.00	7.46	0.00
2015	2015	1.49	0.00	10.54	0.00
2016	2016	1.51	0.00	8.61	0.00
2017	2017	1.50	0.00	6.78	0.00
2018	2018	1.50	0.00	7.33	0.00

## TUBA Demonstration Examples



2019	2019	1.51	0.00	9.36	0.00
2020	2020	1.49	0.00	10.98	0.00
2021	2021	1.67	0.00	16.03	0.00
2022	2022	1.65	0.00	13.78	0.00
2023	2023	1.60	0.00	12.14	0.00
2024	2024	1.59	0.00	10.80	0.00
2025	2025	1.57	0.00	9.77	0.00
2026	2026	1.53	0.00	8.90	0.00
2027	2027	1.52	0.00	8.16	0.00
2028	2028	1.50	0.00	7.56	0.00
2029	2029	1.46	0.00	7.01	0.00
2030	2030	1.45	0.00	6.57	0.00
2031	2031	9.29	0.00	9.29	0.00
2032	2032	8.49	0.00	8.49	0.00
2033	2033	7.84	0.00	7.84	0.00
2034	2034	7.27	0.00	7.27	0.00
2035	2035	6.76	0.00	6.76	0.00
2036	2036	6.34	0.00	6.34	0.00
2037	2037	5.97	0.00	5.97	0.00
2038	2038	5.62	0.00	5.62	0.00
2039	2039	5.33	0.00	5.33	0.00
2040	2040	5.06	0.00	5.06	0.00
2041	2041	4.81	0.00	4.81	0.00
2042	2042	4.60	0.00	4.60	0.00
2043	2043	4.39	0.00	4.39	0.00
2044	2044	4.20	0.00	4.20	0.00
2045	2045	4.04	0.00	4.04	0.00
2046	2046	3.88	0.00	3.88	0.00
2047	2047	3.73	0.00	3.73	0.00

## TUBA Demonstration Examples



2048	2048	3.60	0.00	3.60	0.00
2049	2049	3.48	0.00	3.48	0.00
2050	2050	3.36	0.00	3.36	0.00
2051	2051	3.54	0.00	3.54	0.00
2052	2052	3.31	0.00	3.31	0.00
2053	2053	3.22	0.00	3.22	0.00
2054	2054	3.12	0.00	3.12	0.00
2055	2055	2.93	0.00	2.93	0.00
2056	2056	2.86	0.00	2.86	0.00
2057	2057	2.68	0.00	2.68	0.00
2058	2058	2.55	0.00	2.55	0.00
2059	2059	2.44	0.00	2.44	0.00
2060	2060	2.33	0.00	2.33	0.00
2061	2061	1.80	0.00	1.80	0.00
2062	2062	1.76	0.00	1.76	0.00
2063	2063	1.55	0.00	1.55	0.00
2064	2064	1.45	0.00	1.45	0.00
2065	2065	1.25	0.00	1.25	0.00
2066	2066	1.22	0.00	1.22	0.00
2067	2067	1.01	0.00	1.01	0.00
2068	2068	0.91	0.00	0.91	0.00
2069	2069	0.77	0.00	0.77	0.00
2070	2070	0.66	0.00	0.66	0.00
2071	2071	0.65	0.00	0.65	0.00
2072	2072	0.53	0.00	0.53	0.00
2073	2073	0.45	0.00	0.45	0.00
2074	2074	0.27	0.00	0.27	0.00
2075	2075	0.28	0.00	0.28	0.00
2076	2076	0.03	0.00	0.03	0.00

## TUBA Demonstration Examples



2077	2077	0.03	0.00	0.03	0.00
2078	2078	-0.13	0.00	-0.13	0.00
2079	2079	-0.19	0.00	-0.19	0.00
2080	2080	-0.36	0.00	-0.36	0.00
2081	2081	-0.05	0.00	-0.05	0.00
2082	2082	-0.22	0.00	-0.22	0.00
2083	2083	-0.30	0.00	-0.30	0.00
2084	2084	-0.37	0.00	-0.37	0.00
2085	2085	-0.32	0.00	-0.32	0.00
2086	2086	-0.52	0.00	-0.52	0.00
2087	2087	-0.60	0.00	-0.60	0.00
2088	2088	-0.62	0.00	-0.62	0.00
2089	2089	-0.72	0.00	-0.72	0.00
2090	2090	-0.73	0.00	-0.73	0.00
2091	2091	-0.62	0.00	-0.62	0.00
2092	2092	-0.64	0.00	-0.64	0.00
2093	2093	-0.81	0.00	-0.81	0.00
2094	2094	-0.84	0.00	-0.84	0.00
2095	2095	-0.88	0.00	-0.88	0.00
2096	2096	-0.91	0.00	-0.91	0.00
2097	2097	-0.88	0.00	-0.88	0.00
2098	2098	-1.05	0.00	-1.05	0.00
2099	2099	-0.96	0.00	-0.96	0.00
2100	2100	-1.07	0.00	-1.07	0.00

### FLEET

```
*veh_type %petrol %diesel %Electric
1      59.27  40.729  0.001
2      5.86   94.14   0.00
```

## TUBA Demonstration Examples



3	5.86	94.14	0.00
4	0.00	100.00	0.00
5	0.00	100.00	0.00
6	0.00	100.00	0.00
7	0.00	100.00	0.00
8	0.00	100.00	0.00

### FLEET\_CHANGES

*% p.a.					
*Start_yr	End_yr	veh_type	%change_petrol	%change_diesel	%Change_Electric
2011	2015	1	-4.142	4.955	175.000
2016	2020	1	-1.846	1.300	43.200
2021	2025	1	0.325	-0.839	21.500
2026	2030	1	0.024	-1.087	15.900
2011	2015	2	-9.100	0.468	0.000
2016	2020	2	-12.330	0.361	0.000
2021	2025	2	-11.300	0.173	0.000
2026	2030	2	-5.240	0.050	0.000
2011	2015	3	-9.100	0.468	0.000
2016	2020	3	-12.330	0.361	0.000
2021	2025	3	-11.300	0.173	0.000
2026	2030	3	-5.240	0.050	0.000

### FUEL\_CONSUMPTION

\*Fuel consumption (l/km) = (a\_fuel+b\_fuel\*v+c\_fuel\*v^2+d\_fuel\*v^3)/v where v is speed in km/h

\* Electric added for Veh type 1, 2 and 3. Tabel Petrol parameters?

*veh_type	fuel_type	a_fuel	b_fuel	c_fuel	d_fuel	Cut_off_Speed (km/hr)
1	1	0.964022581	0.041448033	-4.54E-05	2.01E-06	140

## TUBA Demonstration Examples



1	2	0.437094041	0.058616489	-0.00052488	4.13E-06	140
1	3	0	0.12564236	0	0	140
2	1	1.556463336	0.064253318	-0.000744481	1.00552E-05	140
2	2	1.045268333	0.057901415	-0.000432895	8.0252E-06	140
3	1	1.556463336	0.064253318	-0.000744481	1.00552E-05	140
3	2	1.045268333	0.057901415	-0.000432895	8.0252E-06	140
4	2	1.477368474	0.245615208	-0.003572413	0.000030638	96
5	2	3.390702946	0.394379054	-0.004642285	3.59224E-05	96
6	2	4.115603	0.306465	-0.00420643	0.000036526	96

### FUEL\_EFFICIENCY

*% p.a.				
*Start_yr	End_yr	veh_type	fuel_type	change
2011	2015	1	1	2.09
2011	2015	1	2	1.71
2011	2015	1	3	-0.11
2011	2015	2	1	0.66
2011	2015	2	2	2.07
2011	2015	3	1	0.66
2011	2015	3	2	2.07
2016	2020	1	1	3.72
2016	2020	1	2	2.22
2016	2020	1	3	0.31
2016	2020	2	1	1.38
2016	2020	2	2	2.34
2016	2020	3	1	1.38
2016	2020	3	2	2.34
2021	2025	1	1	3.63

## TUBA Demonstration Examples



2021	2025	1	2	2.62
2021	2025	1	3	0.71
2021	2025	2	1	3.07
2021	2025	2	2	2.19
2021	2025	3	1	3.07
2021	2025	3	2	2.19
2026	2030	1	1	2.1
2026	2030	1	2	2.1
2026	2030	1	3	1.19
2026	2030	2	1	2.95
2026	2030	2	2	1.3
2026	2030	3	1	2.95
2026	2030	3	2	1.3
2031	2035	1	1	0.74
2031	2035	1	2	0.96
2031	2035	1	3	0.26
2031	2035	2	1	0.86
2031	2035	2	2	0.57
2031	2035	3	1	0.86
2031	2035	3	2	0.57
2036	2100	1	1	0
2036	2100	1	2	0
2036	2100	1	3	0
2036	2100	2	1	0
2036	2100	2	2	0
2036	2100	3	1	0
2036	2100	3	2	0

## NON\_FUEL\_VOC

```
*veh_type fuel_type a_nonfuel_wrk b_nonfuel_wrk a_nonfuel_nw b_nonfuel_nw
1      1      4.966 135.946 3.846 0
1      2      4.966 135.946 3.846 0
1      3      1.157 0      1.157 0
2      1      7.213 47.113 7.213 0
2      2      7.213 47.113 7.213 0
3      1      7.213 47.113 7.213 0
3      2      7.213 47.113 7.213 0
4      2      6.714 263.817 0      0
5      2      13.061 508.525 0      0
6      2      30.461 694.547 0      0
```

## NON\_FUEL\_VOC\_CHANGES

```
*% p.a.
*Start_yr    End_yr    veh_type      gnf
2011        2100       1      0.000
2011        2100       2      0.000
2011        2100       3      0.000
2011        2100       4      0.000
2011        2100       5      0.000
2011        2100       6      0.000
2011        2100       7      0.000
2011        2100       8      0.000
```

## NON\_FUEL\_TAX\_RATES

\*%

## TUBA Demonstration Examples



*submode	final	intermediate
1	17.5	0.0
2	17.5	0.0
3	17.5	0.0
4	17.5	0.0
5	17.5	0.0
6	17.5	0.0
7	0.0	0.0
8	0.0	0.0

### NON\_FUEL\_TAX\_RATES\_CHANGES

\*% change p.a.

*Start_yr	End_yr	Submode	final	intermediate
2011	2011	1	14.29	0
2011	2011	2	14.29	0
2011	2011	3	14.29	0
2011	2011	4	14.29	0
2011	2011	5	14.29	0
2011	2011	6	14.29	0
2011	2011	7	0	0
2011	2011	8	0	0
2012	2100	1	0	0
2012	2100	2	0	0
2012	2100	3	0	0
2012	2100	4	0	0
2012	2100	5	0	0
2012	2100	6	0	0
2012	2100	7	0	0

2012            2100            8            0            0

## DEFAULT\_PURPOSE\_SPLIT

*Vtype/submode	purpose	Period1	Period2	Period3	Period4	Period5
1	1	18.1	13.0	19.9	12.3	3.2
1	2	46.0	40.8	11.4	36.2	8.5
1	3	35.9	46.2	68.7	51.5	88.3
2	1	0.0	0.0	0.0	0.0	0.0
2	2	0.0	0.0	0.0	0.0	0.0
2	3	100.0	100.0	100.0	100.0	100.0
3	1	100.0	100.0	100.0	100.0	100.0
3	2	0.0	0.0	0.0	0.0	0.0
3	3	0.0	0.0	0.0	0.0	0.0
4	1	100.0	100.0	100.0	100.0	100.0
4	2	0.0	0.0	0.0	0.0	0.0
4	3	0.0	0.0	0.0	0.0	0.0
5	1	100.0	100.0	100.0	100.0	100.0
5	2	0.0	0.0	0.0	0.0	0.0
5	3	0.0	0.0	0.0	0.0	0.0
6	1	3.9	3.9	2.0	5.7	1.5
6	2	30.0	36.6	11.1	38.1	6.4
6	3	66.1	59.5	86.9	56.2	92.1
7	1	1.9	1.8	0.2	2.3	0.4
7	2	82.4	75.7	8.5	28.9	23.3
7	3	15.7	22.5	91.3	68.9	76.3
8	1	14.1	16.4	22.4	23.2	6.3
8	2	51.9	55.9	10.2	53.1	4.3
8	3	34.0	27.7	67.4	23.7	89.4

## TUBA Demonstration Examples



### DEFAULT\_PERSON\_FACTORS

*Vtype/submode	purpose	person_type	FactorPer1	FactorPer2..			
1	1	1	1.00	1.00	1.00	1.00	1.00
1	1	2	0.23	0.17	0.19	0.18	0.28
1	2	1	1.00	1.00	1.00	1.00	1.00
1	2	2	0.16	0.13	0.15	0.13	0.14
1	3	1	1.00	1.00	1.00	1.00	1.00
1	3	2	0.71	0.82	0.78	0.77	0.97
2	2	1	1.00	1.00	1.00	1.00	1.00
2	2	2	0.46	0.46	0.46	0.46	1.03
2	3	1	1.00	1.00	1.00	1.00	1.00
2	3	2	0.46	0.46	0.46	0.46	1.03
3	1	1	1.00	1.00	1.00	1.00	1.00
3	1	2	0.20	0.20	0.20	0.20	0.26
4	1	1	1.00	1.00	1.00	1.00	1.00
5	1	1	1.00	1.00	1.00	1.00	1.00

### DEFAULT\_PERSON\_FACTORS\_CHANGE

\*% change p.a.

*Start_yr	End_yr	Submode	Purpose	Person_type	ChangePer1	ChangePer2	ChangePer3	ChangePer4	ChangePer5
2011	2036	1	1	2	-0.48	-0.62	-0.40	-0.50	-0.48
2011	2036	1	2	2	-0.67	-0.53	-0.65	-0.47	-0.52
2011	2036	1	3	2	-0.67	-0.53	-0.65	-0.47	-0.52

### PREPARATION&SUPERVISION

\* total preparation (by stage) and supervision costs as % of land and construction costs

\*Mode \*Prep:SI Prep:PC Prep:PR Prep:OP Prep: WC Super

## TUBA Demonstration Examples



1	12.0	9.0	9.0	6.0	2.0	5.0
2	12.0	9.0	9.0	6.0	2.0	5.0
3	12.0	9.0	9.0	6.0	2.0	5.0

# Appendix C. Results

## C.1. Example 1

Transport User Benefit Appraisal TUBA v1.9  
 Program run on Tuesday, 14 August 2012 at 15:52:17

### ERRORS AND WARNINGS

2098 Warnings found

Warning (521 serious): Ratio of DM to DS travel time higher than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_time	DS_time	Ratio	DM_trips	DS_trips
1	2	5	OGV1	Business	All	2030	0.511	0.071	7.168	4.000	4.000
1	2	5	OGV1	Commuting	All	2030	0.511	0.071	7.168	4.000	4.000
1	2	5	LGV Freight	Other	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	OGV1	Other	All	2030	0.511	0.071	7.168	4.000	4.000
1	2	5	LGV Freight	Commuting	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	Car	Business	All	2030	0.511	0.071	7.168	12.000	12.000
1	2	5	LGV Freight	Business	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	Car	Other	All	2030	0.509	0.071	7.137	46.000	50.300
1	2	5	Car	Commuting	All	2030	0.509	0.071	7.137	46.000	50.300
1	2	4	OGV1	Commuting	All	2030	0.451	0.073	6.197	5.000	5.000

Displayed 10 warnings of a total of 1996 of this type.

Warning (none serious): Ratio of DM to DS travel distance lower than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_dist	DS_dist	Ratio	DM_trips	DS_trips
2	5	1	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000
2	5	2	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000
2	5	3	Car	Business	All	2030	4.094	6.188	0.662	3.000	3.000

## TUBA Demonstration Examples



2	5	4	Car	Business	All	2030	4.094	6.188	0.662	3.000	3.000
2	5	5	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000
2	5	6	Car	Business	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	7	Car	Business	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	8	Car	Business	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	9	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000
2	5	10	Car	Business	All	2030	4.094	6.188	0.662	3.000	3.000

Displayed 10 warnings of a total of 102 of this type.

TUBA ECONOMICS FILE DIFFERENCES  
STANDARD ECONOMICS FILE USED

### INPUT\_SUMMARY

Run name	Example 1
DM scheme	Do nothing
DS scheme	Bypass
Economic parameter file	C:\Program Files\TUBA\economics\economics_1.9.txt
Scheme parameter file	C:\TUBAdemo\EXAMPLE1_SCHEME.TXT

First year of scheme costs	2010
First Appraisal Year	2015
Last Appraisal Year	2074
Modelled years	2015 2030

Time period	Total hours
AM peak	759
PM peak	759
Inter-peak	1518
Total	3036

Note: All monetary values are in 2010 market prices. All monetary values discounted to 2010 unless otherwise stated.

### DM\_SCHEME\_COSTS

Do minimum scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	0	0	0	0	0	0	0	0
Road	2011	0	0	0	0	0	0	0	0
Road	2012	0	0	0	0	0	0	0	0
Road	2013	0	0	0	0	0	0	0	0
Road	2014	0	0	0	0	0	0	0	0
Road	2015	0	0	0	0	0	0	0	0

### DS\_SCHEME\_COSTS

Do something scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	834	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2011	834	0	0	0	0	0	0	0
Road	2012	834	0	0	0	0	0	0	0
Road	2013	0	695	9474	3790	0	0	0	0
Road	2014	0	695	18949	0	0	0	0	0
Road	2015	0	695	9474	0	0	0	0	0

### PRESENT\_VALUE\_COSTS

Scheme investment and operating costs (i.e. excluding grant/subsidy, developer contributions and delays) and differences. £000s.

Mode	Year	DM_scheme_costs	DS_scheme_costs	Difference
Road	2010	0	834	834
Road	2011	0	806	806
Road	2012	0	778	778
Road	2013	0	12590	12590
Road	2014	0	17118	17118
Road	2015	0	8562	8562
Road	Total	0	40688	40688

### TRIP\_MATRIX\_TOTALS

Annualised total trip numbers (thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2015	AM peak	1152	1174
Car	2015	PM peak	1260	1299
Car	2015	Inter-peak	1547	1577
Car	2015	All	3959	4050
Car	2030	AM peak	1267	1292
Car	2030	PM peak	1387	1423
Car	2030	Inter-peak	1696	1728
Car	2030	All	4349	4444
LGV Freight	2015	AM peak	97	97
LGV Freight	2015	PM peak	97	97
LGV Freight	2015	Inter-peak	124	124
LGV Freight	2015	All	319	319
LGV Freight	2030	AM peak	106	106
LGV Freight	2030	PM peak	106	106
LGV Freight	2030	Inter-peak	134	134
LGV Freight	2030	All	346	346
OGV1	2015	AM peak	38	38
OGV1	2015	PM peak	38	38
OGV1	2015	Inter-peak	52	52
OGV1	2015	All	128	128
OGV1	2030	AM peak	43	43
OGV1	2030	PM peak	43	43
OGV1	2030	Inter-peak	55	55
OGV1	2030	All	140	140
Bus	2015	AM peak	396	363
Bus	2015	PM peak	203	174
Bus	2015	Inter-peak	461	415
Bus	2015	All	1060	953

## TUBA Demonstration Examples



Bus	2030	AM peak	435	398
Bus	2030	PM peak	223	196
Bus	2030	Inter-peak	506	457
Bus	2030	All	1164	1050
All	2015	AM peak	1684	1673
All	2015	PM peak	1598	1608
All	2015	Inter-peak	2183	2169
All	2015	All	5466	5450
All	2030	AM peak	1851	1839
All	2030	PM peak	1759	1768
All	2030	Inter-peak	2390	2373
All	2030	All	6000	5980

### DM&DS\_USER\_COSTS

Total value of user costs, DM and DS. £000s.

Mode	Year	DMtot_time	DMtot_charge	DMtot_fuel	DMtot_nonfuel	DStot_time	DStot_charge	DStot_fuel	DStot_nonfuel
Road	2015	8597	0	2445	1731	4769	0	2853	1859
Road	2030	8074	0	1260	1143	3895	0	1427	1212
Bus	2015	4147	1418	52	70	3576	1263	48	66
Bus	2030	3552	931	36	43	2958	832	32	39

### FUEL\_CONSUMPTION

Total fuel consumption, DM and DS. kilounits.

Submode	Year	Do minimum			Do something		
		petrol	diesel	Electric	petrol	diesel	Electric
Car	2015	894	795	6	1032	884	7
Car	2030	585	616	207	650	663	239
LGV Freight	2015	8	178	0	10	253	0
LGV Freight	2030	1	153	0	2	211	0
OGV1	2015	0	184	0	0	223	0
OGV1	2030	0	210	0	0	245	0
Bus	2015	0	43	0	0	39	0
Bus	2030	0	44	0	0	39	0
All	2015	902	1200	6	1042	1399	7
All	2030	586	1023	207	652	1157	239
Car	Total	35901	37522	10355	40152	40610	11945
LGV Freight	Total	112	9150	0	142	12675	0
OGV1	Total	0	12410	0	0	14517	0
Bus	Total	0	2643	0	0	2344	0
All	Total	36013	61724	10355	40294	70145	11945

### CARBON\_EMISSIONS\_UNTRADED

Submode	Year	Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)			
		cost (£000s, high)			cost (£000s, low)			cost (£000s, central)			
		DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	
DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Car	2030	6	8	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
LGV Freight	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
LGV Freight	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2016	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2017	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2018	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2019	2	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2020	2	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2021	2	3	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2022	3	3	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2023	3	4	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2024	4	5	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2025	5	5	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2026	5	6	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2027	6	7	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2028	6	7	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2029	6	7	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2030	6	8	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2031	6	7	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



All	2032	5	6	1	0	0	0	0	0	0	0
0	0	0	5	6	1	0	0	0	0	0	0
All	2033	0	0	1	0	0	0	0	0	0	0
0	0	0	4	5	1	0	0	0	0	0	0
All	2034	0	0	1	0	0	0	0	0	0	0
0	0	0	4	5	1	0	0	0	0	0	0
All	2035	0	0	1	0	0	0	0	0	0	0
0	0	0	4	5	1	0	0	0	0	0	0
All	2036	0	0	1	0	0	0	0	0	0	0
0	0	0	4	4	1	0	0	0	0	0	0
All	2037	0	0	1	0	0	0	0	0	0	0
0	0	0	3	4	1	0	0	0	0	0	0
All	2038	0	0	0	0	0	0	0	0	0	0
0	0	0	3	4	0	0	0	0	0	0	0
All	2039	0	0	0	0	0	0	0	0	0	0
0	0	0	3	3	0	0	0	0	0	0	0
All	2040	0	0	0	0	0	0	0	0	0	0
0	0	0	3	3	0	0	0	0	0	0	0
All	2041	0	0	0	0	0	0	0	0	0	0
0	0	0	2	3	0	0	0	0	0	0	0
All	2042	0	0	0	0	0	0	0	0	0	0
0	0	0	2	3	0	0	0	0	0	0	0
All	2043	0	0	0	0	0	0	0	0	0	0
0	0	0	2	2	0	0	0	0	0	0	0
All	2044	0	0	0	0	0	0	0	0	0	0
0	0	0	2	2	0	0	0	0	0	0	0
All	2045	0	0	0	0	0	0	0	0	0	0
0	0	0	2	2	0	0	0	0	0	0	0
All	2046	0	0	0	0	0	0	0	0	0	0
0	0	0	2	2	0	0	0	0	0	0	0
All	2047	0	0	0	0	0	0	0	0	0	0
0	0	0	1	2	0	0	0	0	0	0	0
All	2048	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2049	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2050	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2051	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2052	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2053	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2054	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
All	2055	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0

## TUBA Demonstration Examples



All	2056	0	1	1	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0
All	2057	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2058	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2059	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2060	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2061	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2062	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2063	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2064	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2065	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2066	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2067	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2068	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2069	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2070	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2071	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2072	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2073	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2074	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Car	Total	121	140	19	5	6	1	5	6	1	1
5	6	1									
LGV Freight	Total	0	0	0	0	0	0	0	0	0	0
0	0	0									
OGV1	Total	0	0	0	0	0	0	0	0	0	0
0	0	0									
Bus	Total	0	0	0	0	0	0	0	0	0	0
0	0	0									
All	Total	121	140	19	5	6	1	5	6	1	1
5	6	1									

## TUBA Demonstration Examples



CARBON_EMISSIONS_TRADED												
Emissions (tonnes)				cost (£000s, low)				cost (£000s, central)				
cost (£000s, high)		Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
DM	DS	Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2015	0	0	0	0	0	0	0	0	0	0	0
Car	2030	0	0	0	0	0	0	0	0	0	0	0
LGV Freight	2015	0	0	0	0	0	0	0	0	0	0	0
LGV Freight	2030	0	0	0	0	0	0	0	0	0	0	0
OGV1	2015	0	0	0	0	0	0	0	0	0	0	0
OGV1	2030	0	0	0	0	0	0	0	0	0	0	0
Bus	2015	0	0	0	0	0	0	0	0	0	0	0
Bus	2030	0	0	0	0	0	0	0	0	0	0	0
All	2015	0	0	0	0	0	0	0	0	0	0	0
All	2016	0	0	0	0	0	0	0	0	0	0	0
All	2017	0	0	0	0	0	0	0	0	0	0	0
All	2018	0	0	0	0	0	0	0	0	0	0	0
All	2019	0	0	0	0	0	0	0	0	0	0	0
All	2020	0	0	0	0	0	0	0	0	0	0	0
All	2021	0	0	0	0	0	0	0	0	0	0	0
All	2022	0	0	0	0	0	0	0	0	0	0	0
All	2023	0	0	0	0	0	0	0	0	0	0	0
All	2024	0	0	0	0	0	0	0	0	0	0	0
All	2025	0	0	0	0	0	0	0	0	0	0	0
All	2026	0	0	0	0	0	0	0	0	0	0	0
All	2027	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



All	2028	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2029	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2031	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2032	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2033	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2034	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2035	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2036	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2037	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2038	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2039	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2040	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2041	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2042	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2043	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2044	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2045	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2046	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2047	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2048	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2049	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2050	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2051	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



All	2052	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2053	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2054	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2055	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2056	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2057	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2058	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2059	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2060	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2061	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2062	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2063	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2064	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2065	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2066	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2067	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2068	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2069	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2070	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2071	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2072	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2073	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2074	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Car	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Total	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
OGV1	Total	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Bus	Total	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
All	Total	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0

### CARBON\_EMISSIONS\_BY\_TIME\_PERIOD\_UNTRADED

cost (£000s, high)			Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)		
Submode	Year	DM DS Increase	DS	Increase	DM	DS	Increase	DM	DS	Increase	
AM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
AM peak	2030	2	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	2030	2	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	2030	3	3	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
AM peak	Total	36	41	5	1	2	0	1	2	0	0
1	2	0									
PM peak	Total	38	44	6	2	2	0	2	2	0	0
2	2	0									
Inter-peak	Total	47	54	7	2	2	0	2	2	0	0
2	2	0									

### CARBON\_EMISSIONS\_BY\_TIME\_PERIOD\_TRADED

cost (£000s, high)			Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)		
Submode	Year	DM DS Increase	DS	Increase	DM	DS	Increase	DM	DS	Increase	
AM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
AM peak	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Inter-peak	2030	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
AM peak	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

### MODE

User benefits and changes in revenues by mode, all years. £000s.

Mode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel		
Road	2015	3943	0	-355	-128	0	202
Road	2016	4002	0	-333	-123	0	190
Road	2017	4050	0	-313	-118	0	179
Road	2018	4078	0	-294	-113	0	168
Road	2019	4103	0	-275	-109	0	157
Road	2020	4126	0	-258	-104	0	147
Road	2021	4153	0	-242	-100	0	137
Road	2022	4175	0	-227	-96	0	128
Road	2023	4195	0	-212	-92	0	120
Road	2024	4217	0	-199	-88	0	112
Road	2025	4233	0	-187	-85	0	104
Road	2026	4248	0	-177	-81	0	98
Road	2027	4260	0	-167	-78	0	92
Road	2028	4272	0	-158	-75	0	87
Road	2029	4283	0	-150	-72	0	82
Road	2030	4292	0	-142	-69	0	77
Road	2031	4212	0	-136	-66	0	74
Road	2032	4135	0	-131	-64	0	71
Road	2033	4063	0	-126	-62	0	68
Road	2034	3997	0	-121	-60	0	65
Road	2035	3932	0	-116	-58	0	63
Road	2036	3868	0	-112	-56	0	61
Road	2037	3807	0	-108	-54	0	59
Road	2038	3746	0	-105	-52	0	57
Road	2039	3687	0	-101	-50	0	55
Road	2040	3639	0	-98	-49	0	53
Road	2041	3593	0	-95	-47	0	52
Road	2042	3547	0	-93	-46	0	50
Road	2043	3505	0	-90	-45	0	49
Road	2044	3463	0	-87	-43	0	47
Road	2045	3419	0	-85	-42	0	46
Road	2046	3376	0	-82	-41	0	44
Road	2047	3331	0	-80	-40	0	43
Road	2048	3288	0	-78	-39	0	42
Road	2049	3244	0	-75	-37	0	41

## TUBA Demonstration Examples



Road	2050	3202	0	-73	-36	0	39
Road	2051	3157	0	-71	-35	0	38
Road	2052	3114	0	-69	-34	0	37
Road	2053	3071	0	-67	-33	0	36
Road	2054	3029	0	-65	-32	0	35
Road	2055	2988	0	-63	-31	0	34
Road	2056	2947	0	-61	-30	0	33
Road	2057	2907	0	-59	-30	0	32
Road	2058	2868	0	-58	-29	0	31
Road	2059	2829	0	-56	-28	0	30
Road	2060	2791	0	-54	-27	0	29
Road	2061	2755	0	-53	-26	0	29
Road	2062	2719	0	-51	-26	0	28
Road	2063	2684	0	-50	-25	0	27
Road	2064	2650	0	-48	-24	0	26
Road	2065	2616	0	-47	-23	0	25
Road	2066	2582	0	-46	-23	0	25
Road	2067	2549	0	-44	-22	0	24
Road	2068	2516	0	-43	-21	0	23
Road	2069	2483	0	-42	-21	0	23
Road	2070	2451	0	-41	-20	0	22
Road	2071	2420	0	-39	-20	0	21
Road	2072	2389	0	-38	-19	0	21
Road	2073	2358	0	-37	-18	0	20
Road	2074	2328	0	-36	-18	0	19
Bus	2015	195	0	4	4	-187	30
Bus	2016	205	0	4	4	-182	29
Bus	2017	214	0	4	4	-176	28
Bus	2018	221	0	4	4	-171	27
Bus	2019	229	0	4	4	-166	27
Bus	2020	236	0	4	4	-161	26
Bus	2021	243	0	4	4	-156	25
Bus	2022	249	0	4	4	-152	24
Bus	2023	256	0	4	4	-147	23
Bus	2024	262	0	4	4	-143	23
Bus	2025	267	0	4	4	-138	22
Bus	2026	273	0	4	4	-134	21
Bus	2027	278	0	4	4	-130	20
Bus	2028	283	0	4	4	-126	20
Bus	2029	287	0	4	4	-122	19
Bus	2030	291	0	4	4	-119	19
Bus	2031	286	0	4	4	-115	18
Bus	2032	281	0	4	4	-111	17
Bus	2033	276	0	4	3	-107	17
Bus	2034	272	0	4	3	-103	16
Bus	2035	267	0	4	3	-100	16
Bus	2036	263	0	3	3	-97	15
Bus	2037	258	0	3	3	-93	15

## TUBA Demonstration Examples



Bus	2038	254	0	3	3	-90	14
Bus	2039	250	0	3	3	-87	14
Bus	2040	246	0	3	3	-85	13
Bus	2041	243	0	3	3	-82	13
Bus	2042	240	0	3	3	-80	12
Bus	2043	236	0	3	3	-77	12
Bus	2044	233	0	3	2	-75	12
Bus	2045	230	0	3	2	-73	11
Bus	2046	227	0	3	2	-71	11
Bus	2047	224	0	2	2	-69	11
Bus	2048	221	0	2	2	-67	10
Bus	2049	218	0	2	2	-65	10
Bus	2050	215	0	2	2	-63	10
Bus	2051	211	0	2	2	-61	10
Bus	2052	208	0	2	2	-59	9
Bus	2053	205	0	2	2	-58	9
Bus	2054	202	0	2	2	-56	9
Bus	2055	199	0	2	2	-54	8
Bus	2056	196	0	2	2	-53	8
Bus	2057	194	0	2	2	-51	8
Bus	2058	191	0	2	2	-50	8
Bus	2059	188	0	2	2	-48	8
Bus	2060	185	0	2	2	-47	7
Bus	2061	183	0	2	1	-45	7
Bus	2062	180	0	2	1	-44	7
Bus	2063	178	0	2	1	-43	7
Bus	2064	175	0	1	1	-42	6
Bus	2065	173	0	1	1	-40	6
Bus	2066	170	0	1	1	-39	6
Bus	2067	168	0	1	1	-38	6
Bus	2068	166	0	1	1	-37	6
Bus	2069	163	0	1	1	-36	6
Bus	2070	161	0	1	1	-35	5
Bus	2071	159	0	1	1	-34	5
Bus	2072	157	0	1	1	-33	5
Bus	2073	155	0	1	1	-32	5
Bus	2074	152	0	1	1	-31	5
Road	Total	204884	0	-6923	-3136	0	3828
Bus	Total	13249	0	167	155	-5186	817

### SUBMODE

User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.

Submode	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect	
		Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes
Car	2015	3465	0	-214	-136	0	133
Car	2030	3751	0	-67	-82	0	42
LGV Freight	2015	359	0	-94	-11	0	46
LGV Freight	2030	405	0	-47	-5	0	22

## TUBA Demonstration Examples



OGV1	2015	119	0	-47	19	0	23
OGV1	2030	136	0	-28	18	0	13
Bus	2015	195	0	4	4	-187	30
Bus	2030	291	0	4	4	-119	19
All	2015	4138	0	-351	-124	-187	233
All	2030	4583	0	-138	-65	-119	95
Car	Total	178394	0	-3517	-3614	0	2205
LGV Freight	Total	19840	0	-2157	-240	0	1028
OGV1	Total	6651	0	-1249	718	0	595
Bus	Total	13249	0	167	155	-5186	817
All	Total	218133	0	-6755	-2981	-5186	4645

### PERSON\_TYPES

User benefits and changes in revenues by person type, modelled years and total. £000s.

Person_type	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel		
All	2015	3943	0	-355	-128	0	202
All	2030	4292	0	-142	-69	0	77
Driver	2015	7	0	4	4	0	-2
Driver	2030	9	0	4	4	0	-2
Passenger	2015	188	0	0	0	-187	32
Passenger	2030	283	0	0	0	-119	21
All	Total	204884	0	-6923	-3136	0	3828
Driver	Total	429	0	167	155	0	-79
Passenger	Total	12820	0	0	0	-5186	896

### PURPOSE

User benefits and changes in revenues by trip purpose, modelled years and total. £000s.

Purpose	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel		
Business	2015	1829	0	-163	41	0	80
Business	2030	2078	0	-79	46	0	37
Commuting	2015	997	0	-94	-83	-94	76
Commuting	2030	1106	0	-29	-55	-59	29
Other	2015	1312	0	-94	-83	-94	76
Other	2030	1400	0	-29	-55	-59	29
Business	Total	101550	0	-3666	1782	0	1749
Commuting	Total	51460	0	-1545	-2382	-2593	1448
Other	Total	65124	0	-1545	-2382	-2593	1448

### PERIOD

User benefits and changes in revenues by time period, modelled years and total. £000s.

Period	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel		
AM peak	2015	1604	0	-80	-25	-60	57
AM peak	2030	2071	0	-10	-5	-41	15
PM peak	2015	1618	0	-80	-36	-49	59
PM peak	2030	1713	0	-28	-17	-27	22

## TUBA Demonstration Examples



Inter-peak	2015	916	0	-191	-63	-79	117
Inter-peak	2030	799	0	-99	-42	-51	59
AM peak	Total	96580	0	-843	-346	-1745	853
PM peak	Total	82059	0	-1424	-817	-1222	1096
Inter-peak	Total	39495	0	-4488	-1818	-2218	2695

### NON MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (thousands of person hrs) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	0	1	18	26
Car	Business	2030	0	0	0	1	21	43
Car	Business	Total	0	0	-4	54	1225	2427
Car	Commuting	2015	0	0	0	3	66	93
Car	Commuting	2030	0	0	0	4	74	156
Car	Commuting	Total	0	0	-13	220	4377	8833
Car	Other	2015	0	0	0	5	101	142
Car	Other	2030	0	0	0	6	111	230
Car	Other	Total	0	0	-20	330	6555	13112
LGV Freight	Business	2015	0	0	0	1	13	17
LGV Freight	Business	2030	0	0	0	1	14	29
LGV Freight	Business	Total	0	0	-3	38	830	1662
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	0	4	6
OGV1	Business	2030	0	0	0	0	5	10
OGV1	Business	Total	0	0	-1	11	284	554
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	0	1	1
Bus	Business	2030	0	0	0	0	0	4
Bus	Business	Total	0	0	0	9	7	209
Bus	Commuting	2015	0	0	0	0	3	11
Bus	Commuting	2030	0	0	0	1	0	28
Bus	Commuting	Total	0	0	0	45	20	1532
Bus	Other	2015	0	0	0	0	3	11
Bus	Other	2030	0	0	0	1	0	28
Bus	Other	Total	0	0	0	45	20	1532

### MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (£000s) by size of time saving

## TUBA Demonstration Examples



Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	-2	25	531	751
Car	Business	2030	0	0	-2	21	476	978
Car	Business	Total	0	0	-76	1056	24093	46936
Car	Commuting	2015	0	0	-1	17	373	529
Car	Commuting	2030	0	0	-1	16	313	657
Car	Commuting	Total	0	0	-45	762	15223	30106
Car	Other	2015	0	0	-1	24	506	714
Car	Other	2030	0	0	-1	21	413	860
Car	Other	Total	0	0	-60	1004	20060	39335
LGV Freight	Business	2015	0	0	0	7	147	205
LGV Freight	Business	2030	0	0	0	6	129	270
LGV Freight	Business	Total	0	0	-21	303	6583	12974
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	2	50	68
OGV1	Business	2030	0	0	0	2	44	90
OGV1	Business	Total	0	0	-8	91	2247	4321
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	4	14	27
Bus	Business	2030	0	0	0	3	0	61
Bus	Business	Total	0	0	-2	136	118	2799
Bus	Commuting	2015	0	0	0	2	15	63
Bus	Commuting	2030	0	0	0	3	0	117
Bus	Commuting	Total	0	0	0	150	107	5157
Bus	Other	2015	0	0	0	1	13	56
Bus	Other	2030	0	0	0	3	0	104
Bus	Other	Total	0	0	0	133	94	4558

### TOTAL BENEFITS BY TIME SAVING

Total benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	-2	13	521	777
Car	Business	2030	0	0	-2	14	473	1008
Car	Business	Total	0	0	-79	763	23933	48112
Car	Commuting	2015	0	0	-1	-26	257	511
Car	Commuting	2030	0	0	-1	-8	252	658
Car	Commuting	Total	0	0	-47	-288	12454	30001
Car	Other	2015	0	0	-2	-19	390	696

## TUBA Demonstration Examples



Car	Other	2030	0	0	-1	-2	352	860
Car	Other	Total	0	0	-62	-46	17291	39230
LGV Freight	Business	2015	0	0	0	-10	79	185
LGV Freight	Business	2030	0	0	0	-4	91	266
LGV Freight	Business	Total	0	0	-20	-124	4866	12722
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	-8	20	79
OGV1	Business	2030	0	0	0	-5	22	109
OGV1	Business	Total	0	0	-9	-195	1299	5025
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	4	15	34
Bus	Business	2030	0	0	0	3	0	69
Bus	Business	Total	0	0	-4	140	132	3105
Bus	Commuting	2015	0	0	0	2	15	63
Bus	Commuting	2030	0	0	0	3	0	117
Bus	Commuting	Total	0	0	0	150	107	5157
Bus	Other	2015	0	0	0	1	13	56
Bus	Other	2030	0	0	0	3	0	104
Bus	Other	Total	0	0	0	133	94	4558

### NON MONETISED TIME BENEFITS BY DISTANCE

Time benefits (thousands of person hrs) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
>100 kms									
Car 0	Business	2015	0	0	45	0	0	0	0
Car 0	Business	2030	0	1	63	0	0	0	0
Car 0	Business	Total	0	47	3655	0	0	0	0
Car 0	Commuting	2015	0	1	160	0	0	0	0
Car 0	Commuting	2030	0	3	230	0	0	0	0
Car 0	Commuting	Total	0	176	13241	0	0	0	0
Car 0	Other	2015	0	2	245	0	0	0	0

## TUBA Demonstration Examples



Car 0	Other	2030	0	5	341	0	0	0	0
Car 0	Other	Total	0	271	19707	0	0	0	0
LGV Freight 0	Business	2015	0	0	30	0	0	0	0
LGV Freight 0	Business	2030	0	1	43	0	0	0	0
LGV Freight 0	Business	Total	0	32	2495	0	0	0	0
LGV Freight 0	Commuting	2015	0	0	0	0	0	0	0
LGV Freight 0	Commuting	2030	0	0	0	0	0	0	0
LGV Freight 0	Commuting	Total	0	0	0	0	0	0	0
LGV Freight 0	Other	2015	0	0	0	0	0	0	0
LGV Freight 0	Other	2030	0	0	0	0	0	0	0
LGV Freight 0	Other	Total	0	0	0	0	0	0	0
OGV1 0	Business	2015	0	0	10	0	0	0	0
OGV1 0	Business	2030	0	0	15	0	0	0	0
OGV1 0	Business	Total	0	12	835	0	0	0	0
OGV1 0	Commuting	2015	0	0	0	0	0	0	0
OGV1 0	Commuting	2030	0	0	0	0	0	0	0
OGV1 0	Commuting	Total	0	0	0	0	0	0	0
OGV1 0	Other	2015	0	0	0	0	0	0	0
OGV1 0	Other	2030	0	0	0	0	0	0	0
OGV1 0	Other	Total	0	0	0	0	0	0	0
Bus 0	Business	2015	2	0	0	0	0	0	0
Bus 0	Business	2030	3	0	1	0	0	0	0
Bus 0	Business	Total	170	13	42	0	0	0	0
Bus 0	Commuting	2015	14	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus 0	Commuting	2030	29	0	0	0	0	0	0	0	0
Bus 0	Commuting	Total	1597	0	0	0	0	0	0	0	0
Bus 0	Other	2015	14	0	0	0	0	0	0	0	0
Bus 0	Other	2030	29	0	0	0	0	0	0	0	0
Bus 0	Other	Total	1597	0	0	0	0	0	0	0	0

### MONETISED TIME BENEFITS BY DISTANCE

Time benefits (£000s) by distance

Vehicle type >100 kms	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
Car 0	Business	2015	0	11	1295	0	0	0	0
Car 0	Business	2030	0	19	1453	0	0	0	0
Car 0	Business	Total	0	898	71111	0	0	0	0
Car 0	Commuting	2015	0	8	909	0	0	0	0
Car 0	Commuting	2030	0	13	972	0	0	0	0
Car 0	Commuting	Total	0	595	45452	0	0	0	0
Car 0	Other	2015	0	12	1230	0	0	0	0
Car 0	Other	2030	0	18	1275	0	0	0	0
Car 0	Other	Total	0	805	59534	0	0	0	0
LGV Freight 0	Business	2015	0	4	355	0	0	0	0
LGV Freight 0	Business	2030	0	5	400	0	0	0	0
LGV Freight 0	Business	Total	0	252	19588	0	0	0	0
LGV Freight 0	Commuting	2015	0	0	0	0	0	0	0
LGV Freight 0	Commuting	2030	0	0	0	0	0	0	0
LGV Freight 0	Commuting	Total	0	0	0	0	0	0	0
LGV Freight 0	Other	2015	0	0	0	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Other	2030	0	0	0	0	0	0	0	0	0
0											
LGV Freight	Other	Total	0	0	0	0	0	0	0	0	0
0											
OGV1	Business	2015	0	1	118	0	0	0	0	0	0
0											
OGV1	Business	2030	0	2	134	0	0	0	0	0	0
0											
OGV1	Business	Total	0	96	6554	0	0	0	0	0	0
0											
OGV1	Commuting	2015	0	0	0	0	0	0	0	0	0
0											
OGV1	Commuting	2030	0	0	0	0	0	0	0	0	0
0											
OGV1	Commuting	Total	0	0	0	0	0	0	0	0	0
0											
OGV1	Other	2015	0	0	0	0	0	0	0	0	0
0											
OGV1	Other	2030	0	0	0	0	0	0	0	0	0
0											
OGV1	Other	Total	0	0	0	0	0	0	0	0	0
0											
Bus	Business	2015	38	1	5	0	0	0	0	0	0
0											
Bus	Business	2030	55	2	7	0	0	0	0	0	0
0											
Bus	Business	Total	2622	103	326	0	0	0	0	0	0
0											
Bus	Commuting	2015	79	0	0	0	0	0	0	0	0
0											
Bus	Commuting	2030	121	0	0	0	0	0	0	0	0
0											
Bus	Commuting	Total	5413	0	0	0	0	0	0	0	0
0											
Bus	Other	2015	70	0	0	0	0	0	0	0	0
0											
Bus	Other	2030	107	0	0	0	0	0	0	0	0
0											
Bus	Other	Total	4785	0	0	0	0	0	0	0	0
0											

### TOTAL BENEFITS BY DISTANCE

Total benefits (£000s) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
>100 kms									
Car	Business	2015	0	10	1299	0	0	0	0
0									

## TUBA Demonstration Examples



Car 0	Business	2030	0	19	1475	0	0	0	0
Car 0	Business	Total	0	875	71856	0	0	0	0
Car 0	Commuting	2015	0	4	737	0	0	0	0
Car 0	Commuting	2030	0	9	892	0	0	0	0
Car 0	Commuting	Total	0	430	41690	0	0	0	0
Car 0	Other	2015	0	7	1058	0	0	0	0
Car 0	Other	2030	0	14	1194	0	0	0	0
Car 0	Other	Total	0	640	55773	0	0	0	0
LGV Freight 0	Business	2015	0	2	252	0	0	0	0
LGV Freight 0	Business	2030	0	4	349	0	0	0	0
LGV Freight 0	Business	Total	0	187	17256	0	0	0	0
LGV Freight 0	Commuting	2015	0	0	0	0	0	0	0
LGV Freight 0	Commuting	2030	0	0	0	0	0	0	0
LGV Freight 0	Commuting	Total	0	0	0	0	0	0	0
LGV Freight 0	Other	2015	0	0	0	0	0	0	0
LGV Freight 0	Other	2030	0	0	0	0	0	0	0
LGV Freight 0	Other	Total	0	0	0	0	0	0	0
OGV1 0	Business	2015	0	1	89	0	0	0	0
OGV1 0	Business	2030	0	2	124	0	0	0	0
OGV1 0	Business	Total	0	97	6023	0	0	0	0
OGV1 0	Commuting	2015	0	0	0	0	0	0	0
OGV1 0	Commuting	2030	0	0	0	0	0	0	0
OGV1 0	Commuting	Total	0	0	0	0	0	0	0
OGV1 0	Other	2015	0	0	0	0	0	0	0

## TUBA Demonstration Examples



0	0	0	0	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0	0
0	0	Total	0	0	0	0	0	0	0
Bus	Business	2015	38	3	12	0	0	0	0
0	0	2030	55	4	13	0	0	0	0
Bus	Business	Total	2622	169	582	0	0	0	0
0	0	Commuting	2015	79	0	0	0	0	0
Bus	Commuting	2030	121	0	0	0	0	0	0
0	0	Total	5413	0	0	0	0	0	0
Bus	Other	2015	70	0	0	0	0	0	0
0	0	2030	107	0	0	0	0	0	0
Bus	Other	Total	4785	0	0	0	0	0	0
0	0								

### SENSITIVITY

Total user benefits as a percentage of total DM user costs

	Modelled Years	
Mode	2015	2030
Road	27.09%	38.95%
Bus	3.57%	6.57%

### Economy:Economic Efficiency of the Transport System(TEE)

Consumer - Commuting user benefits	All Modes	Road	Bus						
Travel Time	51460	46046	5413						
Vehicle operating costs	-3926	-3926	0						
User charges	0	0	0						
During Construction & Maintenance	-349	-349	0						
NET CONSUMER - COMMUTING BENEFITS	47185	41771	5413						
Consumer - Other user benefits	All Modes	Road	Bus						
Travel Time	65124	60339	4785						
Vehicle operating costs	-3926	-3926	0						
User charges	0	0	0						
During Construction & Maintenance	0	0	0						
NET CONSUMER - OTHER BENEFITS	61197	56413	4785						
Business	All Modes	Road	Personal	Road	Freight	Bus	Personal	Bus	Freight
Travel Time	101550	72008		26491		3051		0	

## TUBA Demonstration Examples



Vehicle operating costs	-1884	722	-2928	322	0
User charges	0	0	0	0	0
During Construction & Maintenance	-174	-87	-87	0	0
Subtotal	99492	72643	23476	3373	0
Private Sector Provider Impacts					
Revenue	-5186	0		-5186	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
Subtotal	-5186	0		-5186	
Other business Impacts					
Developer contributions	0	0		0	
NET BUSINESS IMPACT	94306				
TOTAL					
Present Value of Transport Economic Efficiency Benefits (TEE)		202688			

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

Public Accounts		ALL MODES	Road	Bus
Local Government Funding				
Revenue	0	0	0	0
Operating Costs	0	0	0	0
Investment Costs	0	0	0	0
Developer Contributions	0	0	0	0
Grant/Subsidy Payments	0	0	0	0
NET IMPACT	0	0	0	0
Central Government Funding: Transport		ALL MODES	Road	Bus
Revenue	0	0	0	0
Operating costs	0	0	0	0
Investment costs	40688	40688	0	0
Developer Contributions	0	0	0	0
Grant/Subsidy Payments	0	0	0	0
NET IMPACT	40688	40688	0	0
Central Government Funding: Non-Transport				
Indirect Tax Revenues	-4645	-3828	-817	
TOTALS				
Broad Transport Budget	40688	40688	0	
Wider Public Finances	-4645	-3828	-817	

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.  
 Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Greenhouse Gases	-1
Economic Efficiency: Consumer Users (Commuting)	47185
Economic Efficiency: Consumer Users (Other)	61197
Economic Efficiency: Business Users and Providers	94306
Wider Public Finances (Indirect Taxation Revenues)	4645
Present Value of Benefits (PVB)	207332
 Broad Transport Budget	 40688
Present Value of Costs (PVC)	40688
 OVERALL IMPACTS	 
Net Present Value (NPV)	166644
Benefit to Cost Ratio (BCR)	5.096

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

**C.2.** Example 2

Transport User Benefit Appraisal TUBA v1.9

Program run on Tuesday, 14 August 2012 at 15:57:30

**ERRORS AND WARNINGS**

2098 Warnings found

Warning (521 serious): Ratio of DM to DS travel time higher than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_time	DS_time	Ratio	DM_trips	DS_trips
1	2	5	LGV Freight	Commuting	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	LGV Freight	Other	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	OGV1	Business	All	2030	0.511	0.071	7.168	4.000	4.000
1	2	5	Car	Business	All	2030	0.511	0.071	7.168	12.000	12.000
1	2	5	OGV1	Commuting	All	2030	0.511	0.071	7.168	4.000	4.000

## TUBA Demonstration Examples



1	2	5	OGV1	Other	All	2030	0.511	0.071	7.168	4.000	4.000
1	2	5	LGV Freight	Business	All	2030	0.511	0.071	7.168	9.000	9.000
1	2	5	Car	Commuting	All	2030	0.509	0.071	7.137	46.000	50.300
1	2	5	Car	Other	All	2030	0.509	0.071	7.137	46.000	50.300
1	2	4	LGV Freight	Business	All	2030	0.451	0.073	6.197	13.000	13.000

Displayed 10 warnings of a total of 1996 of this type.

Warning (none serious): Ratio of DM to DS travel distance lower than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_dist	DS_dist	Ratio	DM_trips	DS_trips
2	5	1	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000
2	5	1	Car	Commuting	All	2030	4.094	6.188	0.662	7.000	7.100
2	5	1	Car	Other	All	2030	4.094	6.188	0.662	7.000	7.100
2	5	1	LGV Freight	Business	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	1	LGV Freight	Commuting	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	1	LGV Freight	Other	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	1	OGV1	Business	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	1	OGV1	Commuting	All	2030	4.094	6.188	0.662	1.000	1.000

## TUBA Demonstration Examples



2	5	1	OGV1	Other	All	2030	4.094	6.188	0.662	1.000	1.000
2	5	2	Car	Business	All	2030	4.094	6.188	0.662	2.000	2.000

Displayed 10 warnings of a total of 102 of this type.

### TUBA ECONOMICS FILE DIFFERENCES

#### STANDARD ECONOMICS FILE USED

#### INPUT\_SUMMARY

Run name Example 2

DM scheme Do nothing

DS scheme Bus scheme

Economic parameter file C:\Program Files\TUBA\economics\economics\_1.9.txt

Scheme parameter file C:\TUBAdemo\EXAMPLE2\_SCHEME.TXT

First year of scheme costs 2010

First Appraisal Year 2015

## TUBA Demonstration Examples



Last Appraisal Year 2074

Modelled years 2015 2030

Time period Total hours

AM peak	759
PM peak	759
Inter-peak	1518
Total	3036

Note: All monetary values are in 2010 market prices. All monetary values discounted to 2010 unless otherwise stated.

### DM\_SCHEME\_COSTS

Do minimum scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	0	0	0	0	0	0	0	0
Road	2011	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2012	0	0	0	0	0	0	0	0
Road	2013	0	0	0	0	0	0	0	0
Road	2014	0	0	0	0	0	0	0	0
Road	2015	0	0	0	0	0	0	0	0
Road	2016	0	0	0	0	0	0	0	0
Road	2017	0	0	0	0	0	0	0	0
Road	2018	0	0	0	0	0	0	0	0
Road	2019	0	0	0	0	0	0	0	0
Road	2020	0	0	0	0	0	0	0	0
Road	2021	0	0	0	0	0	0	0	0
Road	2022	0	0	0	0	0	0	0	0
Road	2023	0	0	0	0	0	0	0	0
Road	2024	0	0	0	0	0	0	0	0
Road	2025	0	0	0	0	0	0	0	0
Road	2026	0	0	0	0	0	0	0	0
Road	2027	0	0	0	0	0	0	0	0
Road	2028	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2029	0	0	0	0	0	0	0	0
Road	2030	0	0	0	0	0	0	0	0
Road	2031	0	0	0	0	0	0	0	0
Road	2032	0	0	0	0	0	0	0	0
Road	2033	0	0	0	0	0	0	0	0
Road	2034	0	0	0	0	0	0	0	0
Road	2035	0	0	0	0	0	0	0	0
Road	2036	0	0	0	0	0	0	0	0
Road	2037	0	0	0	0	0	0	0	0
Road	2038	0	0	0	0	0	0	0	0
Road	2039	0	0	0	0	0	0	0	0
Road	2040	0	0	0	0	0	0	0	0
Road	2041	0	0	0	0	0	0	0	0
Road	2042	0	0	0	0	0	0	0	0
Road	2043	0	0	0	0	0	0	0	0
Road	2044	0	0	0	0	0	0	0	0
Road	2045	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2046	0	0	0	0	0	0	0	0
Road	2047	0	0	0	0	0	0	0	0
Road	2048	0	0	0	0	0	0	0	0
Road	2049	0	0	0	0	0	0	0	0
Road	2050	0	0	0	0	0	0	0	0
Road	2051	0	0	0	0	0	0	0	0
Road	2052	0	0	0	0	0	0	0	0
Road	2053	0	0	0	0	0	0	0	0
Road	2054	0	0	0	0	0	0	0	0
Road	2055	0	0	0	0	0	0	0	0
Road	2056	0	0	0	0	0	0	0	0
Road	2057	0	0	0	0	0	0	0	0
Road	2058	0	0	0	0	0	0	0	0
Road	2059	0	0	0	0	0	0	0	0
Road	2060	0	0	0	0	0	0	0	0
Road	2061	0	0	0	0	0	0	0	0
Road	2062	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2063	0	0	0	0	0	0	0	0
Road	2064	0	0	0	0	0	0	0	0
Road	2065	0	0	0	0	0	0	0	0
Road	2066	0	0	0	0	0	0	0	0
Road	2067	0	0	0	0	0	0	0	0
Road	2068	0	0	0	0	0	0	0	0
Road	2069	0	0	0	0	0	0	0	0
Road	2070	0	0	0	0	0	0	0	0
Road	2071	0	0	0	0	0	0	0	0
Road	2072	0	0	0	0	0	0	0	0
Road	2073	0	0	0	0	0	0	0	0
Road	2074	0	0	0	0	0	0	0	0
Bus	2010	0	0	0	0	0	0	0	0
Bus	2011	0	0	0	0	0	0	0	0
Bus	2012	0	0	0	0	0	0	0	0
Bus	2013	0	0	0	0	0	0	0	0
Bus	2014	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus	2015	0	0	0	0	0	0	0	0
Bus	2016	0	0	0	0	0	0	0	0
Bus	2017	0	0	0	0	0	0	0	0
Bus	2018	0	0	0	0	0	0	0	0
Bus	2019	0	0	0	0	0	0	0	0
Bus	2020	0	0	0	0	0	0	0	0
Bus	2021	0	0	0	0	0	0	0	0
Bus	2022	0	0	0	0	0	0	0	0
Bus	2023	0	0	0	0	0	0	0	0
Bus	2024	0	0	0	0	0	0	0	0
Bus	2025	0	0	0	0	0	0	0	0
Bus	2026	0	0	0	0	0	0	0	0
Bus	2027	0	0	0	0	0	0	0	0
Bus	2028	0	0	0	0	0	0	0	0
Bus	2029	0	0	0	0	0	0	0	0
Bus	2030	0	0	0	0	0	0	0	0
Bus	2031	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus	2032	0	0	0	0	0	0	0	0
Bus	2033	0	0	0	0	0	0	0	0
Bus	2034	0	0	0	0	0	0	0	0
Bus	2035	0	0	0	0	0	0	0	0
Bus	2036	0	0	0	0	0	0	0	0
Bus	2037	0	0	0	0	0	0	0	0
Bus	2038	0	0	0	0	0	0	0	0
Bus	2039	0	0	0	0	0	0	0	0
Bus	2040	0	0	0	0	0	0	0	0
Bus	2041	0	0	0	0	0	0	0	0
Bus	2042	0	0	0	0	0	0	0	0
Bus	2043	0	0	0	0	0	0	0	0
Bus	2044	0	0	0	0	0	0	0	0
Bus	2045	0	0	0	0	0	0	0	0
Bus	2046	0	0	0	0	0	0	0	0
Bus	2047	0	0	0	0	0	0	0	0
Bus	2048	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus	2049	0	0	0	0	0	0	0	0
Bus	2050	0	0	0	0	0	0	0	0
Bus	2051	0	0	0	0	0	0	0	0
Bus	2052	0	0	0	0	0	0	0	0
Bus	2053	0	0	0	0	0	0	0	0
Bus	2054	0	0	0	0	0	0	0	0
Bus	2055	0	0	0	0	0	0	0	0
Bus	2056	0	0	0	0	0	0	0	0
Bus	2057	0	0	0	0	0	0	0	0
Bus	2058	0	0	0	0	0	0	0	0
Bus	2059	0	0	0	0	0	0	0	0
Bus	2060	0	0	0	0	0	0	0	0
Bus	2061	0	0	0	0	0	0	0	0
Bus	2062	0	0	0	0	0	0	0	0
Bus	2063	0	0	0	0	0	0	0	0
Bus	2064	0	0	0	0	0	0	0	0
Bus	2065	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus	2066	0	0	0	0	0	0	0	0
Bus	2067	0	0	0	0	0	0	0	0
Bus	2068	0	0	0	0	0	0	0	0
Bus	2069	0	0	0	0	0	0	0	0
Bus	2070	0	0	0	0	0	0	0	0
Bus	2071	0	0	0	0	0	0	0	0
Bus	2072	0	0	0	0	0	0	0	0
Bus	2073	0	0	0	0	0	0	0	0
Bus	2074	0	0	0	0	0	0	0	0

### DS\_SCHEME\_COSTS

Do something scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	208	0	0	0	0	0	0	0
Road	2011	208	0	3158	0	0	0	0	0
Road	2012	208	0	0	0	0	0	0	0
Road	2013	208	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2014	0	174	0	632	0	0	0	0
Road	2015	0	174	3158	0	0	0	0	0
Road	2016	0	0	0	0	0	0	0	0
Road	2017	0	0	0	0	0	0	0	0
Road	2018	0	0	0	0	0	0	0	0
Road	2019	0	0	0	0	0	0	0	0
Road	2020	0	0	0	0	0	0	0	0
Road	2021	0	0	0	0	0	0	0	0
Road	2022	0	0	0	0	0	0	0	0
Road	2023	0	0	0	0	0	0	0	0
Road	2024	0	0	0	0	0	0	0	0
Road	2025	0	0	0	0	0	0	0	0
Road	2026	0	0	0	0	0	0	0	0
Road	2027	0	0	0	0	0	0	0	0
Road	2028	0	0	0	0	0	0	0	0
Road	2029	0	0	0	0	0	0	0	0
Road	2030	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2031	0	0	0	0	0	0	0	0
Road	2032	0	0	0	0	0	0	0	0
Road	2033	0	0	0	0	0	0	0	0
Road	2034	0	0	0	0	0	0	0	0
Road	2035	0	0	0	0	0	0	0	0
Road	2036	0	0	0	0	0	0	0	0
Road	2037	0	0	0	0	0	0	0	0
Road	2038	0	0	0	0	0	0	0	0
Road	2039	0	0	0	0	0	0	0	0
Road	2040	0	0	0	0	0	0	0	0
Road	2041	0	0	0	0	0	0	0	0
Road	2042	0	0	0	0	0	0	0	0
Road	2043	0	0	0	0	0	0	0	0
Road	2044	0	0	0	0	0	0	0	0
Road	2045	0	0	0	0	0	0	0	0
Road	2046	0	0	0	0	0	0	0	0
Road	2047	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2048	0	0	0	0	0	0	0	0
Road	2049	0	0	0	0	0	0	0	0
Road	2050	0	0	0	0	0	0	0	0
Road	2051	0	0	0	0	0	0	0	0
Road	2052	0	0	0	0	0	0	0	0
Road	2053	0	0	0	0	0	0	0	0
Road	2054	0	0	0	0	0	0	0	0
Road	2055	0	0	0	0	0	0	0	0
Road	2056	0	0	0	0	0	0	0	0
Road	2057	0	0	0	0	0	0	0	0
Road	2058	0	0	0	0	0	0	0	0
Road	2059	0	0	0	0	0	0	0	0
Road	2060	0	0	0	0	0	0	0	0
Road	2061	0	0	0	0	0	0	0	0
Road	2062	0	0	0	0	0	0	0	0
Road	2063	0	0	0	0	0	0	0	0
Road	2064	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



Road	2065	0	0	0	0	0	0	0	0
Road	2066	0	0	0	0	0	0	0	0
Road	2067	0	0	0	0	0	0	0	0
Road	2068	0	0	0	0	0	0	0	0
Road	2069	0	0	0	0	0	0	0	0
Road	2070	0	0	0	0	0	0	0	0
Road	2071	0	0	0	0	0	0	0	0
Road	2072	0	0	0	0	0	0	0	0
Road	2073	0	0	0	0	0	0	0	0
Road	2074	0	0	0	0	0	0	0	0
Bus	2010	0	0	0	0	0	0	0	0
Bus	2011	0	0	0	0	0	0	0	0
Bus	2012	0	0	0	0	0	0	0	0
Bus	2013	0	0	0	0	0	0	0	0
Bus	2014	0	0	0	0	0	0	0	0
Bus	2015	0	0	0	0	0	32	126	0
Bus	2016	0	0	0	0	0	32	0	0

## TUBA Demonstration Examples



Bus	2017	0	0	0	0	0	32	0	0
Bus	2018	0	0	0	0	0	32	0	0
Bus	2019	0	0	0	0	0	32	0	0
Bus	2020	0	0	0	0	0	32	0	0
Bus	2021	0	0	0	0	0	32	0	0
Bus	2022	0	0	0	0	0	32	0	0
Bus	2023	0	0	0	0	0	32	0	0
Bus	2024	0	0	0	0	0	32	0	0
Bus	2025	0	0	0	0	0	32	0	0
Bus	2026	0	0	0	0	0	32	0	0
Bus	2027	0	0	0	0	0	32	0	0
Bus	2028	0	0	0	0	0	32	0	0
Bus	2029	0	0	0	0	0	32	0	0
Bus	2030	0	0	0	0	0	32	0	0
Bus	2031	0	0	0	0	0	32	0	0
Bus	2032	0	0	0	0	0	32	0	0
Bus	2033	0	0	0	0	0	32	0	0

## TUBA Demonstration Examples



Bus	2034	0	0	0	0	0	32	0	0
Bus	2035	0	0	0	0	0	32	0	0
Bus	2036	0	0	0	0	0	32	0	0
Bus	2037	0	0	0	0	0	32	0	0
Bus	2038	0	0	0	0	0	32	0	0
Bus	2039	0	0	0	0	0	32	0	0
Bus	2040	0	0	0	0	0	32	0	0
Bus	2041	0	0	0	0	0	32	0	0
Bus	2042	0	0	0	0	0	32	0	0
Bus	2043	0	0	0	0	0	32	0	0
Bus	2044	0	0	0	0	0	32	0	0
Bus	2045	0	0	0	0	0	32	0	0
Bus	2046	0	0	0	0	0	32	0	0
Bus	2047	0	0	0	0	0	32	0	0
Bus	2048	0	0	0	0	0	32	0	0
Bus	2049	0	0	0	0	0	32	0	0
Bus	2050	0	0	0	0	0	32	0	0

## TUBA Demonstration Examples



Bus	2051	0	0	0	0	0	32	0	0
Bus	2052	0	0	0	0	0	32	0	0
Bus	2053	0	0	0	0	0	32	0	0
Bus	2054	0	0	0	0	0	32	0	0
Bus	2055	0	0	0	0	0	32	0	0
Bus	2056	0	0	0	0	0	32	0	0
Bus	2057	0	0	0	0	0	32	0	0
Bus	2058	0	0	0	0	0	32	0	0
Bus	2059	0	0	0	0	0	32	0	0
Bus	2060	0	0	0	0	0	32	0	0
Bus	2061	0	0	0	0	0	32	0	0
Bus	2062	0	0	0	0	0	32	0	0
Bus	2063	0	0	0	0	0	32	0	0
Bus	2064	0	0	0	0	0	32	0	0
Bus	2065	0	0	0	0	0	32	0	0
Bus	2066	0	0	0	0	0	32	0	0
Bus	2067	0	0	0	0	0	32	0	0

## TUBA Demonstration Examples



Bus	2068	0	0	0	0	0	32	0	0
Bus	2069	0	0	0	0	0	32	0	0
Bus	2070	0	0	0	0	0	32	0	0
Bus	2071	0	0	0	0	0	32	0	0
Bus	2072	0	0	0	0	0	32	0	0
Bus	2073	0	0	0	0	0	32	0	0
Bus	2074	0	0	0	0	0	32	0	0

### PRESENT\_VALUE\_COSTS

Scheme investment and operating costs (i.e. excluding grant/subsidy, developer contributions and delays) and differences. £000s.

Mode	Year	DM_scheme_costs	DS_scheme_costs	Difference
Road	2010	0	208	208
Road	2011	0	3253	3253
Road	2012	0	195	195
Road	2013	0	188	188
Road	2014	0	702	702
Road	2015	0	2805	2805

## TUBA Demonstration Examples



Road	2016	0	0	0
Road	2017	0	0	0
Road	2018	0	0	0
Road	2019	0	0	0
Road	2020	0	0	0
Road	2021	0	0	0
Road	2022	0	0	0
Road	2023	0	0	0
Road	2024	0	0	0
Road	2025	0	0	0
Road	2026	0	0	0
Road	2027	0	0	0
Road	2028	0	0	0
Road	2029	0	0	0
Road	2030	0	0	0
Road	2031	0	0	0
Road	2032	0	0	0

## TUBA Demonstration Examples



Road	2033	0	0	0
Road	2034	0	0	0
Road	2035	0	0	0
Road	2036	0	0	0
Road	2037	0	0	0
Road	2038	0	0	0
Road	2039	0	0	0
Road	2040	0	0	0
Road	2041	0	0	0
Road	2042	0	0	0
Road	2043	0	0	0
Road	2044	0	0	0
Road	2045	0	0	0
Road	2046	0	0	0
Road	2047	0	0	0
Road	2048	0	0	0
Road	2049	0	0	0

## TUBA Demonstration Examples



Road	2050	0	0	0
Road	2051	0	0	0
Road	2052	0	0	0
Road	2053	0	0	0
Road	2054	0	0	0
Road	2055	0	0	0
Road	2056	0	0	0
Road	2057	0	0	0
Road	2058	0	0	0
Road	2059	0	0	0
Road	2060	0	0	0
Road	2061	0	0	0
Road	2062	0	0	0
Road	2063	0	0	0
Road	2064	0	0	0
Road	2065	0	0	0
Road	2066	0	0	0

## TUBA Demonstration Examples



Road	2067	0	0	0
Road	2068	0	0	0
Road	2069	0	0	0
Road	2070	0	0	0
Road	2071	0	0	0
Road	2072	0	0	0
Road	2073	0	0	0
Road	2074	0	0	0
Bus	2010	0	0	0
Bus	2011	0	0	0
Bus	2012	0	0	0
Bus	2013	0	0	0
Bus	2014	0	0	0
Bus	2015	0	27	27
Bus	2016	0	26	26
Bus	2017	0	25	25
Bus	2018	0	24	24

## TUBA Demonstration Examples



Bus	2019	0	23	23
Bus	2020	0	22	22
Bus	2021	0	22	22
Bus	2022	0	21	21
Bus	2023	0	20	20
Bus	2024	0	20	20
Bus	2025	0	19	19
Bus	2026	0	18	18
Bus	2027	0	18	18
Bus	2028	0	17	17
Bus	2029	0	16	16
Bus	2030	0	16	16
Bus	2031	0	15	15
Bus	2032	0	15	15
Bus	2033	0	14	14
Bus	2034	0	14	14
Bus	2035	0	13	13

## TUBA Demonstration Examples



Bus	2036	0	13	13
Bus	2037	0	12	12
Bus	2038	0	12	12
Bus	2039	0	12	12
Bus	2040	0	11	11
Bus	2041	0	11	11
Bus	2042	0	11	11
Bus	2043	0	10	10
Bus	2044	0	10	10
Bus	2045	0	10	10
Bus	2046	0	9	9
Bus	2047	0	9	9
Bus	2048	0	9	9
Bus	2049	0	9	9
Bus	2050	0	8	8
Bus	2051	0	8	8
Bus	2052	0	8	8

## TUBA Demonstration Examples



Bus	2053	0	8	8
Bus	2054	0	7	7
Bus	2055	0	7	7
Bus	2056	0	7	7
Bus	2057	0	7	7
Bus	2058	0	7	7
Bus	2059	0	6	6
Bus	2060	0	6	6
Bus	2061	0	6	6
Bus	2062	0	6	6
Bus	2063	0	6	6
Bus	2064	0	6	6
Bus	2065	0	5	5
Bus	2066	0	5	5
Bus	2067	0	5	5
Bus	2068	0	5	5
Bus	2069	0	5	5

## TUBA Demonstration Examples



Bus	2070	0	5	5
Bus	2071	0	5	5
Bus	2072	0	4	4
Bus	2073	0	4	4
Bus	2074	0	4	4
Road	Total	0	7351	7351
Bus	Total	0	704	704

### TRIP\_MATRIX\_TOTALS

Annualised total trip numbers (thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2015	AM peak	1152	1174
Car	2015	PM peak	1260	1299
Car	2015	Inter-peak	1547	1577
Car	2015	All	3959	4050
Car	2030	AM peak	1267	1292
Car	2030	PM peak	1387	1423

## TUBA Demonstration Examples



Car	2030	Inter-peak	1696	1728
Car	2030	All	4349	4444
LGV Freight	2015	AM peak	97	97
LGV Freight	2015	PM peak	97	97
LGV Freight	2015	Inter-peak	124	124
LGV Freight	2015	All	319	319
LGV Freight	2030	AM peak	106	106
LGV Freight	2030	PM peak	106	106
LGV Freight	2030	Inter-peak	134	134
LGV Freight	2030	All	346	346
OGV1	2015	AM peak	38	38
OGV1	2015	PM peak	38	38
OGV1	2015	Inter-peak	52	52
OGV1	2015	All	128	128
OGV1	2030	AM peak	43	43
OGV1	2030	PM peak	43	43
OGV1	2030	Inter-peak	55	55

## TUBA Demonstration Examples



OGV1	2030	All	140	140
Bus	2015	AM peak	396	363
Bus	2015	PM peak	203	174
Bus	2015	Inter-peak	461	415
Bus	2015	All	1060	953
Bus	2030	AM peak	435	398
Bus	2030	PM peak	223	196
Bus	2030	Inter-peak	506	457
Bus	2030	All	1164	1050
All	2015	AM peak	1684	1673
All	2015	PM peak	1598	1608
All	2015	Inter-peak	2183	2169
All	2015	All	5466	5450
All	2030	AM peak	1851	1839
All	2030	PM peak	1759	1768
All	2030	Inter-peak	2390	2373
All	2030	All	6000	5980

## DM&amp;DS\_USER\_COSTS

Total value of user costs, DM and DS. £000s.

Mode	Year	DMtot_time	DMtot_charge	DMtot_fuel	DMtot_nonfuel	DStot_time	DStot_charge	DStot_fuel	DStot_nonfuel
Road	2015	8597	0	2445	1731	4769	0	2853	1859
Road	2030	8074	0	1260	1143	3895	0	1427	1212
Bus	2015	4147	1418	52	70	3576	1263	48	66
Bus	2030	3552	931	36	43	2958	832	32	39

## FUEL\_CONSUMPTION

Total fuel consumption, DM and DS. kilounits.

Submode	Year	Do minimum			Do something		
		petrol	diesel	Electric	petrol	diesel	Electric
Car	2015	894	795	6	1032	884	7
Car	2030	585	616	207	650	663	239
LGV Freight	2015	8	178	0	10	253	0
LGV Freight	2030	1	153	0	2	211	0

## TUBA Demonstration Examples



OGV1	2015	0	184	0	0	223	0
OGV1	2030	0	210	0	0	245	0
Bus	2015	0	43	0	0	39	0
Bus	2030	0	44	0	0	39	0
All	2015	902	1200	6	1042	1399	7
All	2030	586	1023	207	652	1157	239
Car	Total	35901	37522	10355	40152	40610	11945
LGV Freight	Total	112	9150	0	142	12675	0
OGV1	Total	0	12410	0	0	14517	0
Bus	Total	0	2643	0	0	2344	0
All	Total	36013	61724	10355	40294	70145	11945

### CARBON\_EMISSIONS\_UNTRADED

cost (£000s, high)	Emissions (tonnes)			cost (£000s, low)		cost (£000s, central)					
	Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
DM	DS	Increase									
Car	2015	1062	1203	141	26	29	3	52	58	7	
77	88	10									

## TUBA Demonstration Examples



Car	2030	729	796	67	13	15	1	27	29	2
40	44	4								
LGV Freight	2015	125	177	52	3	4	1	6	9	3
9	13	4								
LGV Freight	2030	101	140	38	2	3	1	4	5	1
6	8	2								
OGV1	2015	125	151	26	3	4	1	6	7	1
9	11	2								
OGV1	2030	138	161	23	3	3	0	5	6	1
8	9	1								
Bus	2015	29	27	-2	1	1	0	1	1	0
2	2	0								
Bus	2030	29	26	-3	1	0	0	1	1	0
2	1	0								
All	2015	1340	1557	217	33	38	5	65	76	11
98	114	16								
All	2016	1305	1512	207	31	36	5	62	72	10
93	108	15								
All	2017	1272	1470	198	30	34	5	59	69	9
89	103	14								
All	2018	1240	1429	189	28	33	4	57	65	9
85	98	13								

## TUBA Demonstration Examples



All	2019	1209	1390	181	27	31	4	54	62	8
82	94	12								
All	2020	1180	1353	173	26	30	4	52	60	8
78	89	11								
All	2021	1156	1323	167	25	29	4	50	57	7
75	86	11								
All	2022	1133	1294	161	24	28	3	48	55	7
72	83	10								
All	2023	1111	1266	155	23	26	3	46	53	6
70	79	10								
All	2024	1089	1239	150	22	25	3	45	51	6
67	76	9								
All	2025	1067	1212	144	21	24	3	43	49	6
64	73	9								
All	2026	1053	1193	140	21	24	3	42	47	6
62	71	8								
All	2027	1039	1175	136	20	23	3	40	45	5
60	68	8								
All	2028	1025	1157	132	19	22	3	39	44	5
58	66	8								
All	2029	1011	1140	129	19	21	2	38	42	5
56	64	7								

## TUBA Demonstration Examples



All	2030	998	1123	125	18	20	2	36	41	5
55	61	7								
All	2031	991	1115	124	19	21	2	38	43	5
57	64	7								
All	2032	984	1107	123	20	22	2	40	45	5
60	67	7								
All	2033	977	1100	123	21	23	3	41	46	5
62	69	8								
All	2034	971	1092	122	21	24	3	42	48	5
63	71	8								
All	2035	964	1085	121	22	24	3	43	49	5
65	73	8								
All	2036	964	1085	121	22	25	3	45	50	6
67	75	8								
All	2037	964	1085	121	23	26	3	46	51	6
68	77	9								
All	2038	964	1085	121	23	26	3	47	52	6
70	79	9								
All	2039	964	1085	121	24	27	3	47	53	6
71	80	9								
All	2040	964	1085	121	24	27	3	48	54	6
72	82	9								

## TUBA Demonstration Examples



All 74	2041 83	964 9	1085	121	25	28	3	49	55	6
All 75	2042 84	964 9	1085	121	25	28	3	50	56	6
All 76	2043 85	964 10	1085	121	25	28	3	51	57	6
All 77	2044 86	964 10	1085	121	26	29	3	51	58	6
All 78	2045 87	964 10	1085	121	26	29	3	52	58	6
All 78	2046 88	964 10	1085	121	26	29	3	52	59	7
All 79	2047 89	964 10	1085	121	26	30	3	52	59	7
All 79	2048 89	964 10	1085	121	26	30	3	53	59	7
All 80	2049 90	964 10	1085	121	27	30	3	53	60	7
All 80	2050 90	964 10	1085	121	27	30	3	53	60	7
All 80	2051 90	964 10	1085	121	27	30	3	54	60	7

## TUBA Demonstration Examples



All	2052	964	1085	121	27	30	3	54	60	7
81	91	10								
All	2053	964	1085	121	27	30	3	54	61	7
81	91	10								
All	2054	964	1085	121	27	30	3	54	61	7
81	91	10								
All	2055	964	1085	121	27	30	3	54	61	7
81	91	10								
All	2056	964	1085	121	27	30	3	54	60	7
81	91	10								
All	2057	964	1085	121	27	30	3	54	60	7
80	90	10								
All	2058	964	1085	121	27	30	3	53	60	7
80	90	10								
All	2059	964	1085	121	27	30	3	53	60	7
80	90	10								
All	2060	964	1085	121	26	30	3	53	59	7
79	89	10								
All	2061	964	1085	121	26	29	3	52	59	7
78	88	10								
All	2062	964	1085	121	26	29	3	51	58	6
77	87	10								

## TUBA Demonstration Examples



All 76	2063 86	964 10	1085	121	25	29	3	51	57	6
All 75	2064 84	964 9	1085	121	25	28	3	50	56	6
All 74	2065 83	964 9	1085	121	25	28	3	49	55	6
All 72	2066 82	964 9	1085	121	24	27	3	48	54	6
All 71	2067 80	964 9	1085	121	24	27	3	47	53	6
All 70	2068 78	964 9	1085	121	23	26	3	46	52	6
All 68	2069 77	964 9	1085	121	23	26	3	45	51	6
All 67	2070 75	964 8	1085	121	22	25	3	44	50	6
All 65	2071 73	964 8	1085	121	22	24	3	43	49	5
All 63	2072 71	964 8	1085	121	21	24	3	42	48	5
All 62	2073 70	964 8	1085	121	21	23	3	41	46	5

## TUBA Demonstration Examples



All	2074	964	1085	121	20	23	3	40	45	5
60	68	8								
Car	Total	44698	49101	4403	1072	1178	105	2145	2355	210
3217	3533	316								
LGV Freight	Total	6095	8436	2341	147	203	56	293	406	113
440	609	169								
OGV1	Total	8179	9568	1389	197	231	33	395	462	67
592	693	100								
Bus	Total	1742	1545	-197	42	37	-5	84	75	-10
126	112	-14								
All	Total	60714	68650	7936	1459	1649	190	2917	3297	380
4376	4946	571								

### CARBON\_EMISSIONS\_TRADED

Submode	Year	Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)		
		DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
DM	DS	Increase								
Car	2015	1	1	0	0	0	0	0	0	0
0	0	0								
Car	2030	15	17	2	1	1	0	1	1	0
1	1	0								

## TUBA Demonstration Examples



LGV	Freight	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
LGV	Freight	2030	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1		2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1		2030	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus		2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus		2030	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All		2015	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All		2016	2	2	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All		2017	2	3	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All		2018	3	3	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All		2019	4	4	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



All	2020	4	5	1	0	0	0	0	0	0	0
0	0	0									
All	2021	5	6	1	0	0	0	0	0	0	0
0	0	0									
All	2022	7	8	1	0	0	0	0	0	0	0
0	0	0									
All	2023	8	9	1	0	0	0	0	0	0	0
0	0	0									
All	2024	9	11	1	0	0	0	0	0	0	0
0	0	0									
All	2025	10	12	2	0	0	0	0	0	0	0
0	0	0									
All	2026	12	14	2	0	0	0	0	0	0	0
0	0	0									
All	2027	13	15	2	0	0	0	0	0	0	0
0	0	0									
All	2028	14	16	2	0	1	0	0	1	0	0
0	1	0									
All	2029	14	17	2	1	1	0	1	1	0	0
1	1	0									
All	2030	15	17	2	1	1	0	1	1	0	0
1	1	0									

## TUBA Demonstration Examples



All	2031	13	16	2	1	1	0	1	1	1	0
1	1	0									
All	2032	12	14	2	0	1	0	0	1	1	0
0	1	0									
All	2033	11	13	2	0	1	0	0	1	1	0
0	1	0									
All	2034	10	12	2	0	1	0	0	1	1	0
0	1	0									
All	2035	9	11	1	0	0	0	0	0	0	0
0	0	0									
All	2036	8	10	1	0	0	0	0	0	0	0
0	0	0									
All	2037	8	9	1	0	0	0	0	0	0	0
0	0	0									
All	2038	7	8	1	0	0	0	0	0	0	0
0	0	0									
All	2039	6	7	1	0	0	0	0	0	0	0
0	0	0									
All	2040	6	7	1	0	0	0	0	0	0	0
0	0	0									
All	2041	5	6	1	0	0	0	0	0	0	0
0	0	0									

## TUBA Demonstration Examples



All	2042	5	6	1	0	0	0	0	0	0
0	0	0								
All	2043	5	5	1	0	0	0	0	0	0
0	0	0								
All	2044	4	5	1	0	0	0	0	0	0
0	0	0								
All	2045	4	4	1	0	0	0	0	0	0
0	0	0								
All	2046	3	4	1	0	0	0	0	0	0
0	0	0								
All	2047	3	4	0	0	0	0	0	0	0
0	0	0								
All	2048	3	3	0	0	0	0	0	0	0
0	0	0								
All	2049	3	3	0	0	0	0	0	0	0
0	0	0								
All	2050	2	3	0	0	0	0	0	0	0
0	0	0								
All	2051	2	3	0	0	0	0	0	0	0
0	0	0								
All	2052	2	2	0	0	0	0	0	0	0
0	0	0								

## TUBA Demonstration Examples



All	2053	2	2	0	0	0	0	0	0	0	0
0	0	0									
All	2054	2	2	0	0	0	0	0	0	0	0
0	0	0									
All	2055	2	2	0	0	0	0	0	0	0	0
0	0	0									
All	2056	1	2	0	0	0	0	0	0	0	0
0	0	0									
All	2057	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2058	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2059	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2060	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2061	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2062	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2063	1	1	0	0	0	0	0	0	0	0
0	0	0									

## TUBA Demonstration Examples



All	2064	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2065	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2066	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2067	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	2068	0	1	0	0	0	0	0	0	0	0
0	0	0									
All	2069	0	1	0	0	0	0	0	0	0	0
0	0	0									
All	2070	0	0	0	0	0	0	0	0	0	0
0	0	0									
All	2071	0	0	0	0	0	0	0	0	0	0
0	0	0									
All	2072	0	0	0	0	0	0	0	0	0	0
0	0	0									
All	2073	0	0	0	0	0	0	0	0	0	0
0	0	0									
All	2074	0	0	0	0	0	0	0	0	0	0
0	0	0									

## TUBA Demonstration Examples



Car	Total	274	316	42	11	13	2	11	13	2
11	13	2								
LGV Freight	Total	0	0	0	0	0	0	0	0	0
0	0	0								
OGV1	Total	0	0	0	0	0	0	0	0	0
0	0	0								
Bus	Total	0	0	0	0	0	0	0	0	0
0	0	0								
All	Total	274	316	42	11	13	2	11	13	2
11	13	2								

### CARBON\_EMISSIONS\_BY\_TIME\_PERIOD\_UNTRADED

cost (£000s, high)	Emissions (tonnes)				cost (£000s, low)				cost (£000s, central)			
	Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	
			DM	DS	Increase	DM	DS	Increase	DM	DS	Increase	
AM peak	2015	411	462	50	10	11	1	20	22	2		
30	34	4										
AM peak	2030	322	335	13	6	6	0	12	12	0		
18	18	1										
PM peak	2015	432	487	55	10	12	1	21	24	3		
31	35	4										

## TUBA Demonstration Examples



PM peak	2030	322	350	29	6	6	1	12	13	1
18	19	2								
Inter-peak	2015	497	609	112	12	15	3	24	30	5
36	44	8								
Inter-peak	2030	354	437	83	6	8	2	13	16	3
19	24	5								
AM peak	Total	19451	20488	1036	468	492	25	935	984	49
1403	1476	74								
PM peak	Total	19573	21420	1848	470	514	44	940	1029	88
1411	1543	133								
Inter-peak	Total	21690	26742	5052	521	642	121	1042	1284	243
1562	1927	364								

### CARBON\_EMISSIONS\_BY\_TIME\_PERIOD\_TRADED

cost (£000s, high)	Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)				
	Submode	Year	DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
DM	DS	Increase									
AM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0									
AM peak	2030	4	5	1	0	0	0	0	0	0	0
0	0	0									

## TUBA Demonstration Examples



PM peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
PM peak	2030	5	5	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	2015	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Inter-peak	2030	6	7	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
AM peak	Total	81	93	12	3	4	0	3	4	0	0
3	4	0	0	0	0	0	0	0	0	0	0
PM peak	Total	86	100	14	3	4	1	3	4	0	1
3	4	1	0	0	0	0	0	0	0	0	0
Inter-peak	Total	107	123	16	4	5	1	4	5	0	1
4	5	1	0	0	0	0	0	0	0	0	0

### MODE

User benefits and changes in revenues by mode, all years. £000s.

Mode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect				
				Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes		
Road	2015	3943	0	-355	-128	0	202	0	0	0	0
Road	2016	4002	0	-333	-123	0	190	0	0	0	0

## TUBA Demonstration Examples



Road	2017	4050	0	-313	-118	0	179
Road	2018	4078	0	-294	-113	0	168
Road	2019	4103	0	-275	-109	0	157
Road	2020	4126	0	-258	-104	0	147
Road	2021	4153	0	-242	-100	0	137
Road	2022	4175	0	-227	-96	0	128
Road	2023	4195	0	-212	-92	0	120
Road	2024	4217	0	-199	-88	0	112
Road	2025	4233	0	-187	-85	0	104
Road	2026	4248	0	-177	-81	0	98
Road	2027	4260	0	-167	-78	0	92
Road	2028	4272	0	-158	-75	0	87
Road	2029	4283	0	-150	-72	0	82
Road	2030	4292	0	-142	-69	0	77
Road	2031	4212	0	-136	-66	0	74
Road	2032	4135	0	-131	-64	0	71
Road	2033	4063	0	-126	-62	0	68

## TUBA Demonstration Examples



Road	2034	3997	0	-121	-60	0	65
Road	2035	3932	0	-116	-58	0	63
Road	2036	3868	0	-112	-56	0	61
Road	2037	3807	0	-108	-54	0	59
Road	2038	3746	0	-105	-52	0	57
Road	2039	3687	0	-101	-50	0	55
Road	2040	3639	0	-98	-49	0	53
Road	2041	3593	0	-95	-47	0	52
Road	2042	3547	0	-93	-46	0	50
Road	2043	3505	0	-90	-45	0	49
Road	2044	3463	0	-87	-43	0	47
Road	2045	3419	0	-85	-42	0	46
Road	2046	3376	0	-82	-41	0	44
Road	2047	3331	0	-80	-40	0	43
Road	2048	3288	0	-78	-39	0	42
Road	2049	3244	0	-75	-37	0	41
Road	2050	3202	0	-73	-36	0	39

## TUBA Demonstration Examples



Road	2051	3157	0	-71	-35	0	38
Road	2052	3114	0	-69	-34	0	37
Road	2053	3071	0	-67	-33	0	36
Road	2054	3029	0	-65	-32	0	35
Road	2055	2988	0	-63	-31	0	34
Road	2056	2947	0	-61	-30	0	33
Road	2057	2907	0	-59	-30	0	32
Road	2058	2868	0	-58	-29	0	31
Road	2059	2829	0	-56	-28	0	30
Road	2060	2791	0	-54	-27	0	29
Road	2061	2755	0	-53	-26	0	29
Road	2062	2719	0	-51	-26	0	28
Road	2063	2684	0	-50	-25	0	27
Road	2064	2650	0	-48	-24	0	26
Road	2065	2616	0	-47	-23	0	25
Road	2066	2582	0	-46	-23	0	25
Road	2067	2549	0	-44	-22	0	24

## TUBA Demonstration Examples



Road	2068	2516	0	-43	-21	0	23
Road	2069	2483	0	-42	-21	0	23
Road	2070	2451	0	-41	-20	0	22
Road	2071	2420	0	-39	-20	0	21
Road	2072	2389	0	-38	-19	0	21
Road	2073	2358	0	-37	-18	0	20
Road	2074	2328	0	-36	-18	0	19
Bus	2015	195	0	4	4	-187	30
Bus	2016	205	0	4	4	-182	29
Bus	2017	214	0	4	4	-176	28
Bus	2018	221	0	4	4	-171	27
Bus	2019	229	0	4	4	-166	27
Bus	2020	236	0	4	4	-161	26
Bus	2021	243	0	4	4	-156	25
Bus	2022	249	0	4	4	-152	24
Bus	2023	256	0	4	4	-147	23
Bus	2024	262	0	4	4	-143	23

## TUBA Demonstration Examples



Bus	2025	267	0	4	4	-138	22
Bus	2026	273	0	4	4	-134	21
Bus	2027	278	0	4	4	-130	20
Bus	2028	283	0	4	4	-126	20
Bus	2029	287	0	4	4	-122	19
Bus	2030	291	0	4	4	-119	19
Bus	2031	286	0	4	4	-115	18
Bus	2032	281	0	4	4	-111	17
Bus	2033	276	0	4	3	-107	17
Bus	2034	272	0	4	3	-103	16
Bus	2035	267	0	4	3	-100	16
Bus	2036	263	0	3	3	-97	15
Bus	2037	258	0	3	3	-93	15
Bus	2038	254	0	3	3	-90	14
Bus	2039	250	0	3	3	-87	14
Bus	2040	246	0	3	3	-85	13
Bus	2041	243	0	3	3	-82	13

## TUBA Demonstration Examples



Bus	2042	240	0	3	3	-80	12
Bus	2043	236	0	3	3	-77	12
Bus	2044	233	0	3	2	-75	12
Bus	2045	230	0	3	2	-73	11
Bus	2046	227	0	3	2	-71	11
Bus	2047	224	0	2	2	-69	11
Bus	2048	221	0	2	2	-67	10
Bus	2049	218	0	2	2	-65	10
Bus	2050	215	0	2	2	-63	10
Bus	2051	211	0	2	2	-61	10
Bus	2052	208	0	2	2	-59	9
Bus	2053	205	0	2	2	-58	9
Bus	2054	202	0	2	2	-56	9
Bus	2055	199	0	2	2	-54	8
Bus	2056	196	0	2	2	-53	8
Bus	2057	194	0	2	2	-51	8
Bus	2058	191	0	2	2	-50	8

## TUBA Demonstration Examples



Bus	2059	188	0	2	2	-48	8
Bus	2060	185	0	2	2	-47	7
Bus	2061	183	0	2	1	-45	7
Bus	2062	180	0	2	1	-44	7
Bus	2063	178	0	2	1	-43	7
Bus	2064	175	0	1	1	-42	6
Bus	2065	173	0	1	1	-40	6
Bus	2066	170	0	1	1	-39	6
Bus	2067	168	0	1	1	-38	6
Bus	2068	166	0	1	1	-37	6
Bus	2069	163	0	1	1	-36	6
Bus	2070	161	0	1	1	-35	5
Bus	2071	159	0	1	1	-34	5
Bus	2072	157	0	1	1	-33	5
Bus	2073	155	0	1	1	-32	5
Bus	2074	152	0	1	1	-31	5
Road	Total	204884	0	-6923	-3136	0	3828

## TUBA Demonstration Examples



Bus	Total	13249	0	167	155	-5186	817
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### SUBMODE

User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.

Submode	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect	
		Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes
Car	2015	3465	0	-214	-136	0	133
Car	2030	3751	0	-67	-82	0	42
LGV Freight	2015	359	0	-94	-11	0	46
LGV Freight	2030	405	0	-47	-5	0	22
OGV1	2015	119	0	-47	19	0	23
OGV1	2030	136	0	-28	18	0	13
Bus	2015	195	0	4	4	-187	30
Bus	2030	291	0	4	4	-119	19
All	2015	4138	0	-351	-124	-187	233
All	2030	4583	0	-138	-65	-119	95
Car	Total	178393	0	-3517	-3614	0	2205

## TUBA Demonstration Examples



LGV Freight	Total	19840	0	-2157	-240	0	1028
OGV1	Total	6651	0	-1249	718	0	595
Bus	Total	13249	0	167	155	-5186	817
All	Total	218133	0	-6755	-2981	-5186	4645

### PERSON\_TYPES

User benefits and changes in revenues by person type, modelled years and total. £000s.

Person_type	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect	
		Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes
All	2015	3943	0	-355	-128	0	202
All	2030	4292	0	-142	-69	0	77
Driver	2015	7	0	4	4	0	-2
Driver	2030	9	0	4	4	0	-2
Passenger	2015	188	0	0	0	-187	32
Passenger	2030	283	0	0	0	-119	21
All	Total	204884	0	-6923	-3136	0	3828
Driver	Total	429	0	167	155	0	-79

## TUBA Demonstration Examples



Passenger	Total	12820	0	0	0	-5186	896
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### PURPOSE

User benefits and changes in revenues by trip purpose, modelled years and total. £000s.

Purpose	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect	
		Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes
Business	2015	1829	0	-163	41	0	80
Business	2030	2078	0	-79	46	0	37
Commuting	2015	997	0	-94	-83	-94	76
Commuting	2030	1106	0	-29	-55	-59	29
Other	2015	1312	0	-94	-83	-94	76
Other	2030	1400	0	-29	-55	-59	29
Business	Total	101550	0	-3666	1782	0	1749
Commuting	Total	51460	0	-1545	-2382	-2593	1448
Other	Total	65124	0	-1545	-2382	-2593	1448

### PERIOD

## TUBA Demonstration Examples



User benefits and changes in revenues by time period, modelled years and total. £000s.

Period	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Rev	Indirect			
				Time	PT_fares_(pri)	Fuel	Non_fuel	PT_fares_(pri)	Taxes	
AM peak	2015	1604	0	-80		-25		-60		57
AM peak	2030	2071	0	-10		-5		-41		15
PM peak	2015	1618	0	-80		-36		-49		59
PM peak	2030	1713	0	-28		-17		-27		22
Inter-peak	2015	916	0	-191		-63		-79		117
Inter-peak	2030	799	0	-99		-42		-51		59
AM peak	Total	96580	0	-843		-346		-1745		853
PM peak	Total	82059	0	-1424		-817		-1222		1096
Inter-peak	Total	39495	0	-4488		-1818		-2218		2695

### NON MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (thousands of person hrs) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	0	1	18	26

## TUBA Demonstration Examples



Car	Business	2030	0	0	0	1	21	43
Car	Business	Total	0	0	-4	54	1225	2427
Car	Commuting	2015	0	0	0	3	66	93
Car	Commuting	2030	0	0	0	4	74	156
Car	Commuting	Total	0	0	-13	220	4377	8833
Car	Other	2015	0	0	0	5	101	142
Car	Other	2030	0	0	0	6	111	230
Car	Other	Total	0	0	-20	330	6555	13112
LGV Freight	Business	2015	0	0	0	1	13	17
LGV Freight	Business	2030	0	0	0	1	14	29
LGV Freight	Business	Total	0	0	-3	38	830	1662
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0

## TUBA Demonstration Examples



OGV1	Business	2015	0	0	0	0	4	6
OGV1	Business	2030	0	0	0	0	5	10
OGV1	Business	Total	0	0	-1	11	284	554
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	0	1	1
Bus	Business	2030	0	0	0	0	0	4
Bus	Business	Total	0	0	0	9	7	209
Bus	Commuting	2015	0	0	0	0	3	11
Bus	Commuting	2030	0	0	0	1	0	28
Bus	Commuting	Total	0	0	0	45	20	1532
Bus	Other	2015	0	0	0	0	3	11
Bus	Other	2030	0	0	0	1	0	28

## TUBA Demonstration Examples



Bus	Other	Total	0	0	0	45	20	1532
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### MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	-2	25	531	751
Car	Business	2030	0	0	-2	21	476	978
Car	Business	Total	0	0	-76	1056	24093	46936
Car	Commuting	2015	0	0	-1	17	373	529
Car	Commuting	2030	0	0	-1	16	313	657
Car	Commuting	Total	0	0	-45	762	15223	30106
Car	Other	2015	0	0	-1	24	506	714
Car	Other	2030	0	0	-1	21	413	860
Car	Other	Total	0	0	-60	1004	20060	39335
LGV Freight	Business	2015	0	0	0	7	147	205
LGV Freight	Business	2030	0	0	0	6	129	270
LGV Freight	Business	Total	0	0	-21	303	6583	12974

## TUBA Demonstration Examples



LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	2	50	68
OGV1	Business	2030	0	0	0	2	44	90
OGV1	Business	Total	0	0	-8	91	2247	4321
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	4	14	27
Bus	Business	2030	0	0	0	3	0	61

## TUBA Demonstration Examples



Bus	Business	Total	0	0	-2	136	118	2799
Bus	Commuting	2015	0	0	0	2	15	63
Bus	Commuting	2030	0	0	0	3	0	117
Bus	Commuting	Total	0	0	0	150	107	5157
Bus	Other	2015	0	0	0	1	13	56
Bus	Other	2030	0	0	0	3	0	104
Bus	Other	Total	0	0	0	133	94	4558

### TOTAL BENEFITS BY TIME SAVING

Total benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	-2	13	521	777
Car	Business	2030	0	0	-2	14	473	1008
Car	Business	Total	0	0	-79	763	23933	48112
Car	Commuting	2015	0	0	-1	-26	257	511
Car	Commuting	2030	0	0	-1	-8	252	658
Car	Commuting	Total	0	0	-47	-288	12454	30001

## TUBA Demonstration Examples



Car	Other	2015	0	0	-2	-19	390	696
Car	Other	2030	0	0	-1	-2	352	860
Car	Other	Total	0	0	-62	-46	17291	39230
LGV Freight	Business	2015	0	0	0	-10	79	185
LGV Freight	Business	2030	0	0	0	-4	91	266
LGV Freight	Business	Total	0	0	-20	-124	4866	12722
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	2030	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	2030	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	-8	20	79
OGV1	Business	2030	0	0	0	-5	22	109
OGV1	Business	Total	0	0	-9	-195	1299	5025
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	2030	0	0	0	0	0	0

## TUBA Demonstration Examples



OGV1	Commuting	Total	0	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0	0
OGV1	Other	2030	0	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0	0
Bus	Business	2015	0	0	0	4	15	34	
Bus	Business	2030	0	0	0	3	0	69	
Bus	Business	Total	0	0	-4	140	132	3105	
Bus	Commuting	2015	0	0	0	2	15	63	
Bus	Commuting	2030	0	0	0	3	0	117	
Bus	Commuting	Total	0	0	0	150	107	5157	
Bus	Other	2015	0	0	0	1	13	56	
Bus	Other	2030	0	0	0	3	0	104	
Bus	Other	Total	0	0	0	133	94	4558	

### NON MONETISED TIME BENEFITS BY DISTANCE

Time benefits (thousands of person hrs) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
		>100 kms							

## TUBA Demonstration Examples



Car 0	Business	2015	0	0	45	0	0	0	0
Car 0	Business	2030	0	1	63	0	0	0	0
Car 0	Business	Total	0	47	3655	0	0	0	0
Car 0	Commuting	2015	0	1	160	0	0	0	0
Car 0	Commuting	2030	0	3	230	0	0	0	0
Car 0	Commuting	Total	0	176	13241	0	0	0	0
Car 0	Other	2015	0	2	245	0	0	0	0
Car 0	Other	2030	0	5	341	0	0	0	0
Car 0	Other	Total	0	271	19707	0	0	0	0
LGV Freight 0	Business	2015	0	0	30	0	0	0	0
LGV Freight 0	Business	2030	0	1	43	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Business	Total	0	32	2495	0	0	0	0
0									
LGV Freight	Commuting	2015	0	0	0	0	0	0	0
0									
LGV Freight	Commuting	2030	0	0	0	0	0	0	0
0									
LGV Freight	Commuting	Total	0	0	0	0	0	0	0
0									
LGV Freight	Other	2015	0	0	0	0	0	0	0
0									
LGV Freight	Other	2030	0	0	0	0	0	0	0
0									
LGV Freight	Other	Total	0	0	0	0	0	0	0
0									
OGV1	Business	2015	0	0	10	0	0	0	0
0									
OGV1	Business	2030	0	0	15	0	0	0	0
0									
OGV1	Business	Total	0	12	835	0	0	0	0
0									
OGV1	Commuting	2015	0	0	0	0	0	0	0
0									

## TUBA Demonstration Examples



OGV1 0	Commuting	2030	0	0	0	0	0	0	0
OGV1 0	Commuting	Total	0	0	0	0	0	0	0
OGV1 0	Other	2015	0	0	0	0	0	0	0
OGV1 0	Other	2030	0	0	0	0	0	0	0
OGV1 0	Other	Total	0	0	0	0	0	0	0
Bus 0	Business	2015	2	0	0	0	0	0	0
Bus 0	Business	2030	3	0	1	0	0	0	0
Bus 0	Business	Total	170	13	42	0	0	0	0
Bus 0	Commuting	2015	14	0	0	0	0	0	0
Bus 0	Commuting	2030	29	0	0	0	0	0	0
Bus 0	Commuting	Total	1597	0	0	0	0	0	0

Bus 0	Other	2015	14	0	0	0	0	0	0	0
Bus 0	Other	2030	29	0	0	0	0	0	0	0
Bus 0	Other	Total	1597	0	0	0	0	0	0	0

## MONETISED TIME BENEFITS BY DISTANCE

Time benefits (£000s) by distance

Vehicle type >100 kms	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
Car 0	Business	2015	0	11	1295	0	0	0	0
Car 0	Business	2030	0	19	1453	0	0	0	0
Car 0	Business	Total	0	898	71111	0	0	0	0
Car 0	Commuting	2015	0	8	909	0	0	0	0
Car 0	Commuting	2030	0	13	972	0	0	0	0

## TUBA Demonstration Examples



Car 0	Commuting	Total	0	595	45452	0	0	0	0
Car 0	Other	2015	0	12	1230	0	0	0	0
Car 0	Other	2030	0	18	1275	0	0	0	0
Car 0	Other	Total	0	805	59534	0	0	0	0
LGV Freight 0	Business	2015	0	4	355	0	0	0	0
LGV Freight 0	Business	2030	0	5	400	0	0	0	0
LGV Freight 0	Business	Total	0	252	19588	0	0	0	0
LGV Freight 0	Commuting	2015	0	0	0	0	0	0	0
LGV Freight 0	Commuting	2030	0	0	0	0	0	0	0
LGV Freight 0	Commuting	Total	0	0	0	0	0	0	0
LGV Freight 0	Other	2015	0	0	0	0	0	0	0

## TUBA Demonstration Examples



LGV	Freight	Other	2030	0	0	0	0	0	0	0
0										
LGV	Freight	Other	Total	0	0	0	0	0	0	0
0										
OGV1	Business	2015		0	1	118	0	0	0	0
0										
OGV1	Business	2030		0	2	134	0	0	0	0
0										
OGV1	Business	Total		0	96	6554	0	0	0	0
0										
OGV1	Commuting	2015		0	0	0	0	0	0	0
0										
OGV1	Commuting	2030		0	0	0	0	0	0	0
0										
OGV1	Commuting	Total		0	0	0	0	0	0	0
0										
OGV1	Other	2015		0	0	0	0	0	0	0
0										
OGV1	Other	2030		0	0	0	0	0	0	0
0										
OGV1	Other	Total		0	0	0	0	0	0	0
0										

## TUBA Demonstration Examples



Bus 0	Business	2015	38	1	5	0	0	0	0
Bus 0	Business	2030	55	2	7	0	0	0	0
Bus 0	Business	Total	2622	103	326	0	0	0	0
Bus 0	Commuting	2015	79	0	0	0	0	0	0
Bus 0	Commuting	2030	121	0	0	0	0	0	0
Bus 0	Commuting	Total	5413	0	0	0	0	0	0
Bus 0	Other	2015	70	0	0	0	0	0	0
Bus 0	Other	2030	107	0	0	0	0	0	0
Bus 0	Other	Total	4785	0	0	0	0	0	0

### TOTAL BENEFITS BY DISTANCE

Total benefits (£000s) by distance

## TUBA Demonstration Examples



Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
>100 kms									
Car 0	Business	2015	0	10	1299	0	0	0	0
Car 0	Business	2030	0	19	1475	0	0	0	0
Car 0	Business	Total	0	875	71856	0	0	0	0
Car 0	Commuting	2015	0	4	737	0	0	0	0
Car 0	Commuting	2030	0	9	892	0	0	0	0
Car 0	Commuting	Total	0	430	41690	0	0	0	0
Car 0	Other	2015	0	7	1058	0	0	0	0
Car 0	Other	2030	0	14	1194	0	0	0	0
Car 0	Other	Total	0	640	55773	0	0	0	0
LGV Freight 0	Business	2015	0	2	252	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Business	2030	0	4	349	0	0	0	0
0									
LGV Freight	Business	Total	0	187	17256	0	0	0	0
0									
LGV Freight	Commuting	2015	0	0	0	0	0	0	0
0									
LGV Freight	Commuting	2030	0	0	0	0	0	0	0
0									
LGV Freight	Commuting	Total	0	0	0	0	0	0	0
0									
LGV Freight	Other	2015	0	0	0	0	0	0	0
0									
LGV Freight	Other	2030	0	0	0	0	0	0	0
0									
LGV Freight	Other	Total	0	0	0	0	0	0	0
0									
OGV1	Business	2015	0	1	89	0	0	0	0
0									
OGV1	Business	2030	0	2	124	0	0	0	0
0									
OGV1	Business	Total	0	97	6023	0	0	0	0
0									

## TUBA Demonstration Examples



OGV1 0	Commuting	2015	0	0	0	0	0	0	0
OGV1 0	Commuting	2030	0	0	0	0	0	0	0
OGV1 0	Commuting	Total	0	0	0	0	0	0	0
OGV1 0	Other	2015	0	0	0	0	0	0	0
OGV1 0	Other	2030	0	0	0	0	0	0	0
OGV1 0	Other	Total	0	0	0	0	0	0	0
Bus 0	Business	2015	38	3	12	0	0	0	0
Bus 0	Business	2030	55	4	13	0	0	0	0
Bus 0	Business	Total	2622	169	582	0	0	0	0
Bus 0	Commuting	2015	79	0	0	0	0	0	0
Bus 0	Commuting	2030	121	0	0	0	0	0	0

## TUBA Demonstration Examples



Bus 0	Commuting	Total	5413	0	0	0	0	0	0
Bus 0	Other	2015	70	0	0	0	0	0	0
Bus 0	Other	2030	107	0	0	0	0	0	0
Bus 0	Other	Total	4785	0	0	0	0	0	0

### SENSITIVITY

Total user benefits as a percentage of total DM user costs

#### Modelled Years

Mode	2015	2030
Road	27.09%	38.95%
Bus	3.57%	6.57%

Economy:Economic Efficiency of the Transport System(TEE)

Consumer - Commuting user benefits

All Modes

Road

Bus

## TUBA Demonstration Examples



Travel Time	51460	46046	5413
Vehicle operating costs	-3926	-3926	0
User charges	0	0	0
During Construction & Maintenance	0	0	0
NET CONSUMER - COMMUTING BENEFITS	47533	42120	5413

Consumer - Other user benefits	All Modes	Road	Bus
Travel Time	65124	60339	4785
Vehicle operating costs	-3926	-3926	0
User charges	0	0	0
During Construction & Maintenance	0	0	0
NET CONSUMER - OTHER BENEFITS	61197	56413	4785

Business	All Modes	Road Personal	Road Freight	Bus Personal	Bus Freight
Travel Time	101550	72008	26491	3051	0
Vehicle operating costs	-1884	722	-2928	322	0
User charges	0	0	0	0	0

## TUBA Demonstration Examples



During Construction & Maintenance	0	0	0	0	0
Subtotal	99666	72730	23563	3373	0

### Private Sector Provider Impacts

Revenue	-5186	0	-5186
Operating costs	-704	0	-704
Investment costs	0	0	0
Grant/subsidy	106	0	106
Subtotal	-5783	0	-5783

### Other business Impacts

Developer contributions	0	0	0
NET BUSINESS IMPACT	93883		

### TOTAL

#### Present Value of Transport Economic

Efficiency Benefits (TEE)	202613
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Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

#### Public Accounts

Local Government Funding	ALL MODES	Road	Bus
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	7351	7351	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	106	0	106
NET IMPACT	7457	7351	106

Central Government Funding: Transport	ALL MODES	Road	Bus
Revenue	0	0	0
Operating costs	0	0	0
Investment costs	0	0	0

## TUBA Demonstration Examples



Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	0	0	0

### Central Government Funding: Non-Transport

Indirect Tax Revenues	-4645	-3828	-817
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### TOTALS

Broad Transport Budget	7457	7351	106
Wider Public Finances	-4645	-3828	-817

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

## TUBA Demonstration Examples



Greenhouse Gases -380

Economic Efficiency: Consumer Users (Commuting) 47533

Economic Efficiency: Consumer Users (Other) 61197

Economic Efficiency: Business Users and Providers 93883

Wider Public Finances (Indirect Taxation Revenues) 4645

Present Value of Benefits (PVB) 206878

Broad Transport Budget 7457

Present Value of Costs (PVC) 7457

### OVERALL IMPACTS

Net Present Value (NPV) 199421

Benefit to Cost Ratio (BCR) 27.743

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant

costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

### C.3. Example 3

Transport User Benefit Appraisal TUBA v1.9  
Program run on Tuesday, 14 August 2012 at 15:57:59

#### ERRORS AND WARNINGS

```
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2016 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2017 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2018 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2019 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2020 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2021 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2022 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2023 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2024 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2025 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2026 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2027 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2028 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2029 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2030 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2031 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2032 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2033 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2034 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2035 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2036 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2037 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2038 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2039 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2040 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2041 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2042 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2043 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2044 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2045 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2046 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2047 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2048 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2049 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2050 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2051 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2052 is ignored
Warning: Table VALUE_OF_TIME_GROWTH: data defined from horizon year 2015 to year 2053 is ignored
```



## TUBA Demonstration Examples



Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2024 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2025 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2026 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2027 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2028 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2029 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2030 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2015 to year 2031 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2016 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2021 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2026 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2016 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2021 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2026 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2016 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2021 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2015 to year 2026 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2015 to year 2036 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2015 to year 2036 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2015 to year 2036 is ignored

196 Warnings found

Warning (none serious): Ratio of DM to DS travel time higher than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_time	DS_time	Ratio	DM_trips	DS_trips
2	3	1	LGV	Personal	Other	All	2015	0.128	0.066	1.925	1.120
2	3	1	LGV	Personal	Business	All	2015	0.128	0.066	1.925	1.120
2	3	1	LGV	Freight	Business	All	2015	0.128	0.066	1.925	2.880
2	3	1	Car	Business	All	2015	0.128	0.066	1.925	27.000	27.600
2	3	1	LGV	Freight	Commuting	All	2015	0.128	0.066	1.925	2.880
2	3	1	Car	Other	All	2015	0.128	0.066	1.925	27.000	27.600
2	3	1	LGV	Freight	Other	All	2015	0.128	0.066	1.925	2.880
2	3	1	LGV	Personal	Commuting	All	2015	0.128	0.066	1.925	1.120
2	3	1	OGV1	Business	All	2015	0.128	0.066	1.925	1.200	1.200
2	3	1	Car	Commuting	All	2015	0.128	0.066	1.925	27.000	27.600

Displayed 10 warnings of a total of 90 of this type.

TUBA ECONOMICS FILE DIFFERENCES  
 STANDARD ECONOMICS FILE USED

INPUT\_SUMMARY

Run name	Example 3 demonstrates splitting
DM scheme	Do nothing
DS scheme	Bypass

Economic parameter file	C:\Program Files\TUBA\economics\economics_1.9.txt
Scheme parameter file	C:\TUBAdemo\EXAMPLE3_SCHEME.TXT

## TUBA Demonstration Examples



First year of scheme costs 2010  
 First Appraisal Year 2015  
 Last Appraisal Year 2015  
 Modelled years 2015

Time period	Total hours
AM peak	127
Total	127

Note: All monetary values are in 2010 market prices. All monetary values discounted to 2010 unless otherwise stated.

### DM\_SCHEME\_COSTS

Do minimum scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	0	0	0	0	0	0	0	0
Road	2011	0	0	0	0	0	0	0	0
Road	2012	0	0	0	0	0	0	0	0
Road	2013	0	0	0	0	0	0	0	0
Road	2014	0	0	0	0	0	0	0	0
Road	2015	0	0	0	0	0	0	0	0

### DS\_SCHEME\_COSTS

Do something scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
Road	2010	834	0	0	0	0	0	0	0
Road	2011	834	0	0	0	0	0	0	0
Road	2012	834	0	0	0	0	0	0	0
Road	2013	0	695	9474	3790	0	0	0	0
Road	2014	0	695	18949	0	0	0	0	0
Road	2015	0	695	9474	0	0	0	0	0

### PRESENT\_VALUE\_COSTS

Scheme investment and operating costs (i.e. excluding grant/subsidy, developer contributions and delays) and differences. £000s.

Mode	Year	DM_scheme_costs	DS_scheme_costs	Difference
Road	2010	0	834	834
Road	2011	0	806	806
Road	2012	0	778	778
Road	2013	0	12590	12590
Road	2014	0	17118	17118
Road	2015	0	8562	8562
Road	Total	0	40688	40688

### TRIP\_MATRIX\_TOTALS

Annualised total trip numbers (thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2015	AM peak	91	91
Car	2015	All	91	91

## TUBA Demonstration Examples



LGV Personal	2015	AM peak	4	4
LGV Personal	2015	All	4	4
LGV Freight	2015	AM peak	10	10
LGV Freight	2015	All	10	10
OGV1	2015	AM peak	3	3
OGV1	2015	All	3	3
OGV2	2015	AM peak	2	2
OGV2	2015	All	2	2
Bus	2015	AM peak	13	13
Bus	2015	All	13	13
All	2015	AM peak	124	123
All	2015	All	124	123

### DM&DS\_USER\_COSTS

Total value of user costs, DM and DS. £000s.

Mode	Year	DMtot_time	DMtot_charge	DMtot_fuel	DMtot_nonfuel	DStot_time	DStot_charge	DStot_fuel	DStot_nonfuel
Road	2015	198	0	66	50	131	0	80	52
Bus	2015	11	0	2	3	11	0	2	3

### FUEL\_CONSUMPTION

Total fuel consumption, DM and DS. kilounits.

Submode	Year	Do minimum		Do something		
		petrol	diesel	Electric	petrol	diesel
Car	2015	20	18	0	23	20
LGV Personal	2015	0	2	0	0	3
LGV Freight	2015	0	5	0	0	8
OGV1	2015	0	5	0	0	6
OGV2	2015	0	6	0	0	6
Bus	2015	0	2	0	0	2
All	2015	20	37	0	24	45
Car	Total	20	18	0	23	20
LGV Personal	Total	0	2	0	0	3
LGV Freight	Total	0	5	0	0	8
OGV1	Total	0	5	0	0	6
OGV2	Total	0	6	0	0	6
Bus	Total	0	2	0	0	2
All	Total	20	37	0	24	45

### CARBON\_EMISSIONS\_UNTRADED

Submode	Year	Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)		
		cost (£000s, high)			cost (£000s, low)			cost (£000s, central)		
		DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
DM	DS	Increase	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2015	24	27	4	1	1	0	1	1	0
2	2	0								
LGV Personal	2015	1	2	1	0	0	0	0	0	0
0	0	0								

## TUBA Demonstration Examples



LGV Freight	2015	4	6	2	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1	2015	3	4	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV2	2015	4	4	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus	2015	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	2015	37	44	7	1	1	0	2	2	2	0
3	3	1									
Car	Total	24	27	4	1	1	0	1	1	1	0
2	2	0									
LGV Personal	Total	1	2	1	0	0	0	0	0	0	0
0	0	0									
LGV Freight	Total	4	6	2	0	0	0	0	0	0	0
0	0	0									
OGV1	Total	3	4	1	0	0	0	0	0	0	0
0	0	0									
OGV2	Total	4	4	0	0	0	0	0	0	0	0
0	0	0									
Bus	Total	1	1	0	0	0	0	0	0	0	0
0	0	0									
All	Total	37	44	7	1	1	0	2	2	2	0
3	3	1									

### CARBON\_EMISSIONS\_TRADED

cost (£000s, high)		Emissions (tonnes)			cost (£000s, low)			cost (£000s, central)		
Submode	Year	DM DS Increase	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
LGV Personal	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
LGV Freight	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
OGV1	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
OGV2	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
Bus	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
All	2015	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
Car	Total	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
LGV Personal	Total	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV1	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
OGV2	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
Bus	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
All	Total	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

CARBON_EMISSIONS_BY_TIME_PERIOD_UNTRADED											
Emissions (tonnes)											
cost (£000s, low)											
cost (£000s, high)	Submode	Year	DM DS	DS Increase	Increase	DM	DS	DS Increase	Increase	DM	DS Increase
Submode	AM peak	2015	37	44	7	1	1	0	0	2	2
0	AM peak	Total	3	1	7	1	1	0	0	2	2
0	AM peak	3	3	1	7	1	1	0	0	2	2

CARBON_EMISSIONS_BY_TIME_PERIOD_TRADED											
Emissions (tonnes)											
cost (£000s, low)											
cost (£000s, high)	Submode	Year	DM DS	DS Increase	Increase	DM	DS	DS Increase	Increase	DM	DS Increase
Submode	AM peak	2015	0	0	0	0	0	0	0	0	0
0	AM peak	Total	0	0	0	0	0	0	0	0	0
0	AM peak	0	0	0	0	0	0	0	0	0	0

MODE											
User benefits and changes in revenues by mode, all years. £000s.											
Mode	Year	User Time	User_Charges PT_fares_(pri)	Vehicle_Operating_Cost Fuel	Operator_Rev PT_fares_(pri)	Indirect Taxes					
Road	2015	65	0	-14	-2	0	7				
Bus	2015	0	0	0	0	0	0				
Road	Total	65	0	-14	-2	0	7				
Bus	Total	0	0	0	0	0	0				

SUBMODE											
User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.											
Submode	Year	User Time	User_Charges PT_fares_(pri)	Vehicle_Operating_Cost Fuel	Operator_Rev PT_fares_(pri)	Indirect Taxes					
Car	2015	54	0	-7	-2	0	3				
LGV Personal	2015	1	0	-1	0	0	1				
LGV Freight	2015	7	0	-3	0	0	2				
OGV1	2015	2	0	-2	0	0	1				

## TUBA Demonstration Examples



OGV2	2015	1	0	-1	0	0	0
Bus	2015	0	0	0	0	0	0
All	2015	65	0	-14	-2	0	7
Car	Total	54	0	-7	-2	0	3
LGV Personal	Total	1	0	-1	0	0	1
LGV Freight	Total	7	0	-3	0	0	2
OGV1	Total	2	0	-2	0	0	1
OGV2	Total	1	0	-1	0	0	0
Bus	Total	0	0	0	0	0	0
All	Total	65	0	-14	-2	0	7

### PERSON\_TYPES

User benefits and changes in revenues by person type, modelled years and total. £000s.

Person_type	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel	Taxes
All	2015	65	0	-14	-2	0
Driver	2015	0	0	0	0	0
Passenger	2015	0	0	0	0	0
All	Total	65	0	-14	-2	0
Driver	Total	0	0	0	0	0
Passenger	Total	0	0	0	0	0

### PURPOSE

User benefits and changes in revenues by trip purpose, modelled years and total. £000s.

Purpose	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel	Taxes
Business	2015	38	0	-7	0	0
Commuting	2015	13	0	-3	-1	0
Other	2015	15	0	-4	-1	0
Business	Total	38	0	-7	0	0
Commuting	Total	13	0	-3	-1	0
Other	Total	15	0	-4	-1	0

### PERIOD

User benefits and changes in revenues by time period, modelled years and total. £000s.

Period	Year	User	User_Charges	Vehicle_Operating_Cost	Operator_Rev	Indirect
		Time	PT_fares_(pri)	Fuel	Non_fuel	Taxes
AM peak	2015	65	0	-14	-2	0
AM peak	Total	65	0	-14	-2	0

### NON MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (thousands of person hrs) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	5 to > 5 mins
Car	Business	2015	0	0	0	0	1	0
Car	Business	Total	0	0	0	0	1	0
Car	Commuting	2015	0	0	0	0	2	0
Car	Commuting	Total	0	0	0	0	2	0
Car	Other	2015	0	0	0	0	3	0

## TUBA Demonstration Examples



Car	Other	Total	0	0	0	0	3	0
LGV Personal	Business	2015	0	0	0	0	0	0
LGV Personal	Business	Total	0	0	0	0	0	0
LGV Personal	Commuting	2015	0	0	0	0	0	0
LGV Personal	Commuting	Total	0	0	0	0	0	0
LGV Personal	Other	2015	0	0	0	0	0	0
LGV Personal	Other	Total	0	0	0	0	0	0
LGV Freight	Business	2015	0	0	0	0	1	0
LGV Freight	Business	Total	0	0	0	0	1	0
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	0	0	0
OGV1	Business	Total	0	0	0	0	0	0
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
OGV2	Business	2015	0	0	0	0	0	0
OGV2	Business	Total	0	0	0	0	0	0
OGV2	Commuting	2015	0	0	0	0	0	0
OGV2	Commuting	Total	0	0	0	0	0	0
OGV2	Other	2015	0	0	0	0	0	0
OGV2	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	0	0	0
Bus	Business	Total	0	0	0	0	0	0
Bus	Commuting	2015	0	0	0	0	0	0
Bus	Commuting	Total	0	0	0	0	0	0
Bus	Other	2015	0	0	0	0	0	0
Bus	Other	Total	0	0	0	0	0	0

### MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	0	1	27	0
Car	Business	Total	0	0	0	1	27	0
Car	Commuting	2015	0	0	0	1	13	0
Car	Commuting	Total	0	0	0	1	13	0
Car	Other	2015	0	0	0	1	13	0
Car	Other	Total	0	0	0	1	13	0
LGV Personal	Business	2015	0	0	0	0	0	0
LGV Personal	Business	Total	0	0	0	0	0	0
LGV Personal	Commuting	2015	0	0	0	0	0	0
LGV Personal	Commuting	Total	0	0	0	0	0	0
LGV Personal	Other	2015	0	0	0	0	1	0
LGV Personal	Other	Total	0	0	0	0	1	0
LGV Freight	Business	2015	0	0	0	0	6	0

## TUBA Demonstration Examples



LGV Freight	Business	Total	0	0	0	0	6	0
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	0	2	0
OGV1	Business	Total	0	0	0	0	2	0
OGV1	Commuting	2015	0	0	0	0	0	0
OGV1	Commuting	Total	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0
OGV2	Business	2015	0	0	0	0	1	0
OGV2	Business	Total	0	0	0	0	1	0
OGV2	Commuting	2015	0	0	0	0	0	0
OGV2	Commuting	Total	0	0	0	0	0	0
OGV2	Other	2015	0	0	0	0	0	0
OGV2	Other	Total	0	0	0	0	0	0
Bus	Business	2015	0	0	0	0	0	0
Bus	Business	Total	0	0	0	0	0	0
Bus	Commuting	2015	0	0	0	0	0	0
Bus	Commuting	Total	0	0	0	0	0	0
Bus	Other	2015	0	0	0	0	0	0
Bus	Other	Total	0	0	0	0	0	0

### TOTAL BENEFITS BY TIME SAVING

Total benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2015	0	0	0	1	26	0
Car	Business	Total	0	0	0	1	26	0
Car	Commuting	2015	0	0	0	-1	9	0
Car	Commuting	Total	0	0	0	-1	9	0
Car	Other	2015	0	0	0	0	10	0
Car	Other	Total	0	0	0	0	10	0
LGV Personal	Business	2015	0	0	0	0	0	0
LGV Personal	Business	Total	0	0	0	0	0	0
LGV Personal	Commuting	2015	0	0	0	0	0	0
LGV Personal	Commuting	Total	0	0	0	0	0	0
LGV Personal	Other	2015	0	0	0	0	0	0
LGV Personal	Other	Total	0	0	0	0	0	0
LGV Freight	Business	2015	0	0	0	0	3	0
LGV Freight	Business	Total	0	0	0	0	3	0
LGV Freight	Commuting	2015	0	0	0	0	0	0
LGV Freight	Commuting	Total	0	0	0	0	0	0
LGV Freight	Other	2015	0	0	0	0	0	0
LGV Freight	Other	Total	0	0	0	0	0	0
OGV1	Business	2015	0	0	0	0	1	0
OGV1	Business	Total	0	0	0	0	1	0
OGV1	Commuting	2015	0	0	0	0	0	0

## TUBA Demonstration Examples



OGV1	Commuting	Total	0	0	0	0	0	0	0	0
OGV1	Other	2015	0	0	0	0	0	0	0	0
OGV1	Other	Total	0	0	0	0	0	0	0	0
OGV2	Business	2015	0	0	0	0	0	1	0	0
OGV2	Business	Total	0	0	0	0	0	1	0	0
OGV2	Commuting	2015	0	0	0	0	0	0	0	0
OGV2	Commuting	Total	0	0	0	0	0	0	0	0
OGV2	Other	2015	0	0	0	0	0	0	0	0
OGV2	Other	Total	0	0	0	0	0	0	0	0
Bus	Business	2015	0	0	0	0	0	0	0	0
Bus	Business	Total	0	0	0	0	0	0	0	0
Bus	Commuting	2015	0	0	0	0	0	0	0	0
Bus	Commuting	Total	0	0	0	0	0	0	0	0
Bus	Other	2015	0	0	0	0	0	0	0	0
Bus	Other	Total	0	0	0	0	0	0	0	0

### NON MONETISED TIME BENEFITS BY DISTANCE

Time benefits (thousands of person hrs) by distance

Vehicle type >100 kms	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
Car 0	Business	2015	0	0	1	0	0	0	0
Car 0	Business	Total	0	0	1	0	0	0	0
Car 0	Commuting	2015	0	0	2	0	0	0	0
Car 0	Commuting	Total	0	0	2	0	0	0	0
Car 0	Other	2015	0	0	3	0	0	0	0
Car 0	Other	Total	0	0	3	0	0	0	0
LGV Personal 0	Business	2015	0	0	0	0	0	0	0
LGV Personal 0	Business	Total	0	0	0	0	0	0	0
LGV Personal 0	Commuting	2015	0	0	0	0	0	0	0
LGV Personal 0	Commuting	Total	0	0	0	0	0	0	0
LGV Personal 0	Other	2015	0	0	0	0	0	0	0
LGV Personal 0	Other	Total	0	0	0	0	0	0	0
LGV Freight 0	Business	2015	0	0	1	0	0	0	0
LGV Freight 0	Business	Total	0	0	1	0	0	0	0

## TUBA Demonstration Examples



LGV Freight	Commuting	2015	0	0	0	0	0	0	0	0
0										
LGV Freight	Commuting	Total	0	0	0	0	0	0	0	0
0										
LGV Freight	Other	2015	0	0	0	0	0	0	0	0
0										
LGV Freight	Other	Total	0	0	0	0	0	0	0	0
0										
OGV1	Business	2015	0	0	0	0	0	0	0	0
0										
OGV1	Business	Total	0	0	0	0	0	0	0	0
0										
OGV1	Commuting	2015	0	0	0	0	0	0	0	0
0										
OGV1	Commuting	Total	0	0	0	0	0	0	0	0
0										
OGV1	Other	2015	0	0	0	0	0	0	0	0
0										
OGV1	Other	Total	0	0	0	0	0	0	0	0
0										
OGV2	Business	2015	0	0	0	0	0	0	0	0
0										
OGV2	Business	Total	0	0	0	0	0	0	0	0
0										
OGV2	Commuting	2015	0	0	0	0	0	0	0	0
0										
OGV2	Commuting	Total	0	0	0	0	0	0	0	0
0										
OGV2	Other	2015	0	0	0	0	0	0	0	0
0										
OGV2	Other	Total	0	0	0	0	0	0	0	0
0										
Bus	Business	2015	0	0	0	0	0	0	0	0
0										
Bus	Business	Total	0	0	0	0	0	0	0	0
0										
Bus	Commuting	2015	0	0	0	0	0	0	0	0
0										
Bus	Commuting	Total	0	0	0	0	0	0	0	0
0										
Bus	Other	2015	0	0	0	0	0	0	0	0
0										
Bus	Other	Total	0	0	0	0	0	0	0	0
0										

MONETISED TIME BENEFITS BY DISTANCE  
Time benefits (£000s) by distance

## TUBA Demonstration Examples



Vehicle type >100 kms	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
Car 0	Business	2015	0	0	28	0	0	0	0
Car 0	Business	Total	0	0	28	0	0	0	0
Car 0	Commuting	2015	0	0	13	0	0	0	0
Car 0	Commuting	Total	0	0	13	0	0	0	0
Car 0	Other	2015	0	0	13	0	0	0	0
Car 0	Other	Total	0	0	13	0	0	0	0
LGV Personal 0	Business	2015	0	0	0	0	0	0	0
LGV Personal 0	Business	Total	0	0	0	0	0	0	0
LGV Personal 0	Commuting	2015	0	0	0	0	0	0	0
LGV Personal 0	Commuting	Total	0	0	0	0	0	0	0
LGV Personal 0	Other	2015	0	0	1	0	0	0	0
LGV Personal 0	Other	Total	0	0	1	0	0	0	0
LGV Freight 0	Business	2015	0	0	7	0	0	0	0
LGV Freight 0	Business	Total	0	0	7	0	0	0	0
LGV Freight 0	Commuting	2015	0	0	0	0	0	0	0
LGV Freight 0	Commuting	Total	0	0	0	0	0	0	0
LGV Freight 0	Other	2015	0	0	0	0	0	0	0
LGV Freight 0	Other	Total	0	0	0	0	0	0	0
OGV1 0	Business	2015	0	0	2	0	0	0	0
OGV1 0	Business	Total	0	0	2	0	0	0	0
OGV1 0	Commuting	2015	0	0	0	0	0	0	0
OGV1 0	Commuting	Total	0	0	0	0	0	0	0
OGV1 0	Other	2015	0	0	0	0	0	0	0

## TUBA Demonstration Examples



OGV1 0	Other	Total	0	0	0	0	0	0	0	0	0
OGV2 0	Business	2015	0	0	1	0	0	0	0	0	0
OGV2 0	Business	Total	0	0	1	0	0	0	0	0	0
OGV2 0	Commuting	2015	0	0	0	0	0	0	0	0	0
OGV2 0	Commuting	Total	0	0	0	0	0	0	0	0	0
OGV2 0	Other	2015	0	0	0	0	0	0	0	0	0
OGV2 0	Other	Total	0	0	0	0	0	0	0	0	0
Bus 0	Business	2015	0	0	0	0	0	0	0	0	0
Bus 0	Business	Total	0	0	0	0	0	0	0	0	0
Bus 0	Commuting	2015	0	0	0	0	0	0	0	0	0
Bus 0	Commuting	Total	0	0	0	0	0	0	0	0	0
Bus 0	Other	2015	0	0	0	0	0	0	0	0	0
Bus 0	Other	Total	0	0	0	0	0	0	0	0	0

### TOTAL BENEFITS BY DISTANCE

Total benefits (£000s) by distance			< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms
Vehicle type	Purpose	Year							
>100 kms									
Car 0	Business	2015	0	0	27	0	0	0	0
Car 0	Business	Total	0	0	27	0	0	0	0
Car 0	Commuting	2015	0	0	8	0	0	0	0
Car 0	Commuting	Total	0	0	8	0	0	0	0
Car 0	Other	2015	0	0	9	0	0	0	0
Car 0	Other	Total	0	0	9	0	0	0	0
LGV Personal 0	Business	2015	0	0	0	0	0	0	0
LGV Personal 0	Business	Total	0	0	0	0	0	0	0

## TUBA Demonstration Examples



LGV Personal	Commuting	2015	0	0	0	0	0	0	0	0
0										
LGV Personal	Commuting	Total	0	0	0	0	0	0	0	0
0										
LGV Personal	Other	2015	0	0	0	0	0	0	0	0
0										
LGV Personal	Other	Total	0	0	0	0	0	0	0	0
0										
LGV Freight	Business	2015	0	0	3	0	0	0	0	0
0										
LGV Freight	Business	Total	0	0	3	0	0	0	0	0
0										
LGV Freight	Commuting	2015	0	0	0	0	0	0	0	0
0										
LGV Freight	Commuting	Total	0	0	0	0	0	0	0	0
0										
LGV Freight	Other	2015	0	0	0	0	0	0	0	0
0										
LGV Freight	Other	Total	0	0	0	0	0	0	0	0
0										
OGV1	Business	2015	0	0	1	0	0	0	0	0
0										
OGV1	Business	Total	0	0	1	0	0	0	0	0
0										
OGV1	Commuting	2015	0	0	0	0	0	0	0	0
0										
OGV1	Commuting	Total	0	0	0	0	0	0	0	0
0										
OGV1	Other	2015	0	0	0	0	0	0	0	0
0										
OGV1	Other	Total	0	0	0	0	0	0	0	0
0										
OGV2	Business	2015	0	0	1	0	0	0	0	0
0										
OGV2	Business	Total	0	0	1	0	0	0	0	0
0										
OGV2	Commuting	2015	0	0	0	0	0	0	0	0
0										
OGV2	Commuting	Total	0	0	0	0	0	0	0	0
0										
OGV2	Other	2015	0	0	0	0	0	0	0	0
0										
OGV2	Other	Total	0	0	0	0	0	0	0	0
0										
Bus	Business	2015	0	0	0	0	0	0	0	0
0										
Bus	Business	Total	0	0	0	0	0	0	0	0
0										

## TUBA Demonstration Examples



Bus 0	Commuting	2015	0	0	0	0	0	0	0
Bus 0	Commuting	Total	0	0	0	0	0	0	0
Bus 0	Other	2015	0	0	0	0	0	0	0
Bus 0	Other	Total	0	0	0	0	0	0	0

### SENSITIVITY

Total user benefits as a percentage of total DM user costs

Modelled Years

Mode	2015
Road	15.49%
Bus	0.77%

### Economy:Economic Efficiency of the Transport System(TEE)

Consumer - Commuting user benefits	All Modes	Road	Bus						
Travel Time	13	13	0						
Vehicle operating costs	-5	-5	0						
User charges	0	0	0						
During Construction & Maintenance	-349	-349	0						
NET CONSUMER - COMMUTING BENEFITS	-340	-340	0						
Consumer - Other user benefits	All Modes	Road	Bus						
Travel Time	15	15	0						
Vehicle operating costs	-5	-5	0						
User charges	0	0	0						
During Construction & Maintenance	0	0	0						
NET CONSUMER - OTHER BENEFITS	9	9	0						
Business	All Modes	Road	Personal	Road	Freight	Bus	Personal	Bus	Freight
Travel Time	38	28	10	0	0	0	0	0	0
Vehicle operating costs	-7	-1	-6	0	0	0	0	0	0
User charges	0	0	0	0	0	0	0	0	0
During Construction & Maintenance	-174	-87	-87	0	0	0	0	0	0
Subtotal	-143	-60	-83	0	0	0	0	0	0
Private Sector Provider Impacts									
Revenue	0	0	0	0	0	0	0	0	0
Operating costs	0	0	0	0	0	0	0	0	0
Investment costs	0	0	0	0	0	0	0	0	0
Grant/subsidy	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0	0
Other business Impacts									
Developer contributions	0	0	0	0	0	0	0	0	0

## TUBA Demonstration Examples



NET BUSINESS IMPACT -143

**TOTAL**  
 Present Value of Transport Economic  
 Efficiency Benefits (TEE) -474

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Bus
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	0	0	0

Central Government Funding: Transport	ALL MODES	Road	Bus
Revenue	0	0	0
Operating costs	0	0	0
Investment costs	40688	40688	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	40688	40688	0

### Central Government Funding: Non-Transport

Indirect Tax Revenues	-7	-7	0
<b>TOTALS</b>			
Broad Transport Budget	40688	40688	0
Wider Public Finances	-7	-7	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Greenhouse Gases	0
Economic Efficiency: Consumer Users (Commuting)	-340
Economic Efficiency: Consumer Users (Other)	9
Economic Efficiency: Business Users and Providers	-143
Wider Public Finances (Indirect Taxation Revenues)	7
Present Value of Benefits (PVB)	-467
 Broad Transport Budget	 40688

## TUBA Demonstration Examples



Present Value of Costs (PVC) 40688

### OVERALL IMPACTS

Net Present Value (NPV) -41155  
Benefit to Cost Ratio (BCR) -0.011

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

#### C.4. Example 4

Transport User Benefit Appraisal TUBA v1.8  
 Program run on Friday, 28 January 2011 at 18:10:27

##### ERRORS AND WARNINGS

Warning: Table VALUE\_OF\_TIME\_GROWTH: data defined from horizon year 2025 to year 2032 is ignored  
 Warning: Table VALUE\_OF\_TIME\_GROWTH: data defined from horizon year 2025 to year 2052 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2026 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2026 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2027 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2027 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2028 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2028 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2029 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2029 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2030 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2030 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2031 is ignored  
 Warning: Table FUEL\_COST\_CHANGES: data defined from horizon year 2025 to year 2031 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2025 to year 2026 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2025 to year 2026 is ignored  
 Warning: Table FLEET\_CHANGES: data defined from horizon year 2025 to year 2026 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2025 to year 2036 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2025 to year 2036 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2025 to year 2036 is ignored  
 Warning: Table DEFAULT\_PERSON\_FACTORS\_CHANGE: data defined from horizon year 2025 to year 2036 is ignored

90 Warnings found

Warning (none serious): Ratio of DM to DS travel time higher than limit for the following:

Origin	Destination	Time_slice	Veh_type	Purpose	Person_type	Year	DM_time	DS_time	Ratio	DM_trips	DS_trips
3	5	12	Car	Non_busine	All	2025	0.144	0.059	2.443	13.890	14.000
3	5	12	Car	Non_busine	All	2025	0.144	0.059	2.443	10.000	10.000
4	2	6	Car	Business	All	2025	0.279	0.141	1.985	0.920	0.940
4	2	6	LGV Freight	Business	All	2025	0.279	0.141	1.985	1.000	1.000
4	2	6	Car	Non_busine	All	2025	0.279	0.141	1.985	0.830	0.510
4	2	6	Car	Non_busine	All	2025	0.279	0.141	1.985	1.000	1.000
4	2	6	Car	Non_busine	All	2025	0.279	0.141	1.985	0.840	0.400
4	5	6	Car	Non_busine	All	2025	0.293	0.154	1.898	0.920	0.730
4	5	6	Car	Non_busine	All	2025	0.293	0.154	1.898	1.000	1.000
4	5	6	Car	Non_busine	All	2025	0.293	0.154	1.898	0.930	0.630

Displayed 10 warnings of a total of 69 of this type.

## TUBA Demonstration Examples



INPUT\_SUMMARY

Run name	Example 4
DM scheme	Do nothing
DS scheme	Bypass
Economic parameter file	C:\TUBAdemo\std_economics_1.8_Jan11_byIncome_purpose.txt
Scheme parameter file	C:\TUBAdemo\EXAMPLE4_SCHEME.TXT
First year of scheme costs	2010
First Appraisal Year	2025
Last Appraisal Year	2025
Modelled years	2025
Time period	Total hours
AM peak	759
PM peak	759
Inter-peak	1518
Total	3036

Note: All monetary values are in 2002 market prices. All monetary values discounted to 2002 unless otherwise stated.

### DM\_SCHEME\_COSTS

Do minimum scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
------	------	-------	---------	---------	------	--------	-------	------------	-----------

### DS\_SCHEME\_COSTS

Do something scheme costs. Undiscounted £000s

Mode	Year	Prep.	Superv.	Constr.	Land	Maint.	Oper.	Grant/Sub.	Dev._Cont
------	------	-------	---------	---------	------	--------	-------	------------	-----------

### PRESENT\_VALUE\_COSTS

Scheme investment and operating costs (i.e. excluding grant/subsidy, developer contributions and delays) and differences. £000s.

Mode	Year	DM_scheme_costs	DS_scheme_costs	Difference
------	------	-----------------	-----------------	------------

### TRIP\_MATRIX\_TOTALS

Annualised total trip numbers(thousands)

Submode	Year	Time period	DO MIN	DO SOM
Car	2025	AM peak	697	580
Car	2025	PM peak	773	697
Car	2025	Inter-peak	950	802
Car	2025	All	2421	2079
LGV Freight	2025	AM peak	106	106
LGV Freight	2025	PM peak	106	106
LGV Freight	2025	Inter-peak	134	134
LGV Freight	2025	All	346	346
OGV1	2025	AM peak	43	43

## TUBA Demonstration Examples



OGV1	2025	PM peak	43	43
OGV1	2025	Inter-peak	55	55
OGV1	2025	All	140	140
Bus	2025	AM peak	246	446
Bus	2025	PM peak	128	258
Bus	2025	Inter-peak	267	520
Bus	2025	All	641	1224
All	2025	AM peak	1092	1176
All	2025	PM peak	1050	1104
All	2025	Inter-peak	1405	1510
All	2025	All	3548	3790

### DM&DS\_USER\_COSTS

Total value of user costs, DM and DS. £000s.

Mode	Year	DMtot_time	DMtot_charge	DMtot_fuel	DMtot_nonfuel	DStot_time	DStot_charge	DStot_fuel	DStot_nonfuel
Road	2025	3964	0	600	584	3272	4984	520	521
Bus	2025	1401	462	23	32	2302	908	22	31

### FUEL\_CONSUMPTION

Total fuel consumption, DM and DS. kilolitres.

Submode	Year	Do minimum		Do something	
		petrol	diesel	petrol	diesel
Car	2025	430	386	352	318
LGV Freight	2025	3	170	3	165
OGV1	2025	0	209	0	200
Bus	2025	0	44	0	42
All	2025	433	810	355	725
Car	Total	430	386	352	318
LGV Freight	Total	3	170	3	165
OGV1	Total	0	209	0	200
Bus	Total	0	44	0	42
All	Total	433	810	355	725

### CARBON\_EMISSION

Submode	Year	cost (£000s, low)			cost (£000s, central)			cost (£000s, high)		
		DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
Car	2025	525	431	-94	23	19	-4	47	70	58
LGV Freight	2025	118	114	-4	5	5	0	11	16	15
OGV1	2025	143	137	-6	6	6	0	13	19	18
Bus	2025	30	29	-1	1	1	0	3	4	4
All	2025	817	711	-105	36	32	-5	73	109	95
Car	Total	525	431	-94	23	19	-4	47	70	58
LGV Freight	Total	118	114	-4	5	5	0	11	16	15
OGV1	Total	143	137	-6	6	6	0	13	19	18
Bus	Total	30	29	-1	1	1	0	3	4	0
All	Total	817	711	-105	36	32	-5	73	109	95

### CARBON\_EMISSION\_BY\_TIME\_PERIOD

Submode	Year	cost (£000s, low)			cost (£000s, central)			cost (£000s, high)		
		DM	DS	Increase	DM	DS	Increase	DM	DS	Increase
AM peak	2025	256	214	-42	11	10	-2	23	34	29
PM peak	2025	267	235	-33	12	10	-1	24	36	31
Interpeak	(tonnes)	293	262	-31	13	12	-1	26	39	35

## TUBA Demonstration Examples



AM peak	Total	256	214	-42	11	10	-2	23		-4	34	29	-6
PM peak	Total	267	235	-33	12	10	-1	24	19	-3	36	31	-4
Inter-peak	Total	293	262	-31	13	12	-1	26	21	-3	39	35	-4

### MODE

User benefits and changes in revenues by mode, all years. £000s.

Mode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Revenue		Indirect	Taxes
		Time	PT_fares_(pri)	LA_tolls	Fuel	Non_fuel	PT_fares_(pri)	LA_tolls	
Road	2025	465	0	-2415	22	61	0	2524	-311
Bus	2025	57	0	0	1	1	537	0	-92
Road	Total	465	0	-2415	22	61	0	2524	-311
Bus	Total	57	0	0	1	1	537	0	-92

### SUBMODE

User benefits and changes in revenues by submode/vehicle type, modelled years and total. £000s.

Submode	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Revenue		Indirect	Taxes
		Time	PT_fares_(pri)	LA_tolls	Fuel	Non_fuel	PT_fares_(pri)	LA_tolls	
Car	2025	380	0	-1931	14	55	0	2041	-306
LGV Freight	2025	64	0	-345	3	2	0	345	-2
OGV1	2025	21	0	-138	5	4	0	138	-3
Bus	2025	57	0	0	1	1	537	0	-92
All	2025	522	0	-2415	23	62	537	2524	-403
Car	Total	380	0	-1931	14	55	0	2041	-306
LGV Freight	Total	64	0	-345	3	2	0	345	-2
OGV1	Total	21	0	-138	5	4	0	138	-3
Bus	Total	57	0	0	1	1	537	0	-92
All	Total	522	0	-2415	23	62	537	2524	-403

### PERSON\_TYPES

User benefits and changes in revenues by person type, modelled years and total. £000s.

Person_type	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Revenue		Indirect	Taxes
		Time	PT_fares_(pri)	LA_tolls	Fuel	Non_fuel	PT_fares_(pri)	LA_tolls	
All	2025	465	0	-2415	22	61	0	2524	-311
Driver	2025	2	0	0	1	1	0	0	-1
Passenger	2025	55	0	0	0	0	537	0	-91
All	Total	465	0	-2415	22	61	0	2524	-311
Driver	Total	2	0	0	1	1	0	0	-1
Passenger	Total	55	0	0	0	0	537	0	-91

### PURPOSE

User benefits and changes in revenues by trip purpose, modelled years and total. £000s.

Purpose	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Revenue		Indirect	Taxes
		Time	PT_fares_(pri)	LA_tolls	Fuel	Non_fuel	PT_fares_(pri)	LA_tolls	
Business	2025	329	0	-995	12	14	8	991	-8
Non_business	2025	49	0	-447	3	27	300	437	-148
Non_business	2025	77	0	-545	4	21	228	580	-156
Non_business	2025	68	0	-427	3	0	0	516	-91
Business	Total	329	0	-995	12	14	8	991	-8
Non_business	Total	49	0	-447	3	27	300	437	-148

## TUBA Demonstration Examples



Non_business	Total	77	0	-545	4	21	228	580	-156
Non_business	Total	68	0	-427	3	0	0	516	-91

### PERIOD

User benefits and changes in revenues by time period, modelled years and total. £000s.

Period	Year	User	User_Charges	Vehicle_Operating_Cost		Operator_Revenue		Indirect	Taxes
		Time	PT_fares_(pri)	LA_tolls	Fuel	Non_fuel	PT_fares_(pri)	LA_tolls	
AM peak	2025	256	0	-695	11	24	189	715	-123
PM peak	2025	261	0	-780	12	18	117	836	-124
Inter-peak	2025	6	0	-939	0	21	231	974	-155
AM peak	Total	256	0	-695	11	24	189	715	-123
PM peak	Total	261	0	-780	12	18	117	836	-124
Inter-peak	Total	6	0	-939	0	21	231	974	-155

### NON MONETISED TIME BENEFITS BY TIME SAVING

Time benefits (thousands of person hrs) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2025	0	0	0	1	3	10
Car	Business	Total	0	0	0	1	3	10
Car	Non_business_L	2025	0	0	0	1	3	13
Car	Non_business_LTTotal	0	0	0	0	1	3	13
Car	Non_business_M	2025	0	0	0	2	4	16
Car	Non_business_MTTotal	0	0	0	0	2	4	16
Car	Non_business_H	2025	0	0	0	1	3	13
Car	Non_business_HTotal	0	0	0	0	1	3	13
LGV Freight	Business	2025	0	0	0	1	2	7
LGV Freight	Business	Total	0	0	0	1	2	7
LGV Freight	Non_business_L	2025	0	0	0	0	0	0
LGV Freight	Non_business_LTTotal	0	0	0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0	0
LGV Freight	Non_business_MTTotal	0	0	0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0	0
LGV Freight	Non_business_HTotal	0	0	0	0	0	0	0
OGV1	Business	2025	0	0	0	0	1	2
OGV1	Business	Total	0	0	0	0	1	2
OGV1	Non_business_L	2025	0	0	0	0	0	0
OGV1	Non_business_LTTotal	0	0	0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0	0
OGV1	Non_business_MTTotal	0	0	0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0	0
OGV1	Non_business_HTotal	0	0	0	0	0	0	0
Bus	Business	2025	0	0	0	0	0	1
Bus	Business	Total	0	0	0	0	0	1
Bus	Non_business_L	2025	0	0	0	0	2	5
Bus	Non_business_LTTotal	0	0	0	0	0	2	5
Bus	Non_business_M	2025	0	0	0	0	1	5
Bus	Non_business_MTTotal	0	0	0	0	0	1	5
Bus	Non_business_H	2025	0	0	0	0	1	2

## TUBA Demonstration Examples



Bus	Non_business_HTotal	0	0	0	0	1	2
MONETISED TIME BENEFITS BY TIME SAVING							
Time benefits (£000s) by size of time saving							
Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins
Car	Business	2025	0	0	0	18	43
Car	Business	Total	0	0	0	18	43
Car	Non_business_L	2025	0	0	0	3	7
Car	Non_business_LTtotal		0	0	0	3	7
Car	Non_business_M	2025	0	0	0	5	11
Car	Non_business_MTtotal		0	0	0	5	11
Car	Non_business_H	2025	0	0	0	4	11
Car	Non_business_Htotal		0	0	0	4	11
LGV Freight	Business	2025	0	0	0	5	12
LGV Freight	Business	Total	0	0	0	5	12
LGV Freight	Non_business_L	2025	0	0	0	0	0
LGV Freight	Non_business_LTtotal		0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0
LGV Freight	Non_business_MTtotal		0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0
LGV Freight	Non_business_Htotal		0	0	0	0	0
OGV1	Business	2025	0	0	0	2	4
OGV1	Business	Total	0	0	0	2	4
OGV1	Non_business_L	2025	0	0	0	0	0
OGV1	Non_business_LTtotal		0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0
OGV1	Non_business_MTtotal		0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0
OGV1	Non_business_Htotal		0	0	0	0	0
Bus	Business	2025	0	0	0	1	4
Bus	Business	Total	0	0	0	1	4
Bus	Non_business_L	2025	0	0	0	1	3
Bus	Non_business_LTtotal		0	0	0	1	3
Bus	Non_business_M	2025	0	0	0	1	4
Bus	Non_business_MTtotal		0	0	0	1	4
Bus	Non_business_H	2025	0	0	0	1	2
Bus	Non_business_Htotal		0	0	0	1	2

## TOTAL BENEFITS BY TIME SAVING

Total benefits (£000s) by size of time saving

Vehicle type	Purpose	Year	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins
Car	Business	2025	0	0	-69	-300	1	93
Car	Business	Total	0	0	-69	-300	1	93
Car	Non_business_L	2025	0	0	-62	-252	-29	-38
Car	Non_business_LTTotal		0	0	-62	-252	-29	-38
Car	Non_business_M	2025	0	0	-75	-315	-35	-36
Car	Non_business_MTTotal		0	0	-75	-315	-35	-36
Car	Non_business_H	2025	0	0	-57	-261	-25	-22
Car	Non_business_HTotal		0	0	-57	-261	-25	-22
LGV Freight	Business	2025	0	0	-91	-164	-18	-4
LGV Freight	Business	Total	0	0	-91	-164	-18	-4
LGV Freight	Non_business_L	2025	0	0	0	0	0	0
LGV Freight	Non_business_LTTotal		0	0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0	0
LGV Freight	Non_business_MTTotal		0	0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0	0
LGV Freight	Non_business_HTotal		0	0	0	0	0	0
OGV1	Business	2025	0	0	-36	-66	-6	0
OGV1	Business	Total	0	0	-36	-66	-6	0
OGV1	Non_business_L	2025	0	0	0	0	0	0
OGV1	Non_business_LTTotal		0	0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0	0
OGV1	Non_business_MTTotal		0	0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0	0
OGV1	Non_business_HTotal		0	0	0	0	0	0
Bus	Business	2025	0	0	0	1	5	13
Bus	Business	Total	0	0	0	1	5	13
Bus	Non_business_L	2025	0	0	0	1	3	10
Bus	Non_business_LTTotal		0	0	0	1	3	10
Bus	Non_business_M	2025	0	0	0	1	4	13
Bus	Non_business_MTTotal		0	0	0	1	4	13
Bus	Non_business_H	2025	0	0	0	1	2	6
Bus	Non_business_HTotal		0	0	0	1	2	6

## TUBA Demonstration Examples



### NON MONETISED TIME BENEFITS BY DISTANCE

Time benefits (thousands of person hrs) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms	>100 kms
Car	Business	2025	0	0	14	0	0	0	0	0
Car	Business	Total	0	0	14	0	0	0	0	0
Car	Non_business_L	2025	0	0	18	0	0	0	0	0
Car	Non_business_LTotal		0	0	18	0	0	0	0	0
Car	Non_business_M	2025	0	1	22	0	0	0	0	0
Car	Non_business_MTotal		0	1	22	0	0	0	0	0
Car	Non_business_H	2025	0	0	17	0	0	0	0	0
Car	Non_business_HTotal		0	0	17	0	0	0	0	0
LGV Freight	Business	2025	0	0	10	0	0	0	0	0
LGV Freight	Business	Total	0	0	10	0	0	0	0	0
LGV Freight	Non_business_L	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_LTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_MTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_HTotal		0	0	0	0	0	0	0	0
OGV1	Business	2025	0	0	3	0	0	0	0	0
OGV1	Business	Total	0	0	3	0	0	0	0	0
OGV1	Non_business_L	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_LTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_MTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_HTotal		0	0	0	0	0	0	0	0
Bus	Business	2025	1	0	0	0	0	0	0	0
Bus	Business	Total	1	0	0	0	0	0	0	0
Bus	Non_business_L	2025	7	0	0	0	0	0	0	0
Bus	Non_business_LTTotal		7	0	0	0	0	0	0	0
Bus	Non_business_M	2025	7	0	0	0	0	0	0	0
Bus	Non_business_MTotal		7	0	0	0	0	0	0	0
Bus	Non_business_H	2025	3	0	0	0	0	0	0	0
Bus	Non_business_HTotal		3	0	0	0	0	0	0	0

## TUBA Demonstration Examples



### MONETISED TIME BENEFITS BY DISTANCE Time benefits (£000s) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms	>100 kms
Car	Business	2025	0	4	223	0	0	0	0	0
Car	Business	Total	0	4	223	0	0	0	0	0
Car	Non_business_L	2025	0	1	35	0	0	0	0	0
Car	Non_business_LTotal		0	1	35	0	0	0	0	0
Car	Non_business_M	2025	0	1	58	0	0	0	0	0
Car	Non_business_MTotal		0	1	58	0	0	0	0	0
Car	Non_business_H	2025	0	1	58	0	0	0	0	0
Car	Non_business_HTotal		0	1	58	0	0	0	0	0
LGV Freight	Business	2025	0	1	63	0	0	0	0	0
LGV Freight	Business	Total	0	1	63	0	0	0	0	0
LGV Freight	Non_business_L	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_LTTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_MTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_HTotal		0	0	0	0	0	0	0	0
OGV1	Business	2025	0	0	21	0	0	0	0	0
OGV1	Business	Total	0	0	21	0	0	0	0	0
OGV1	Non_business_L	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_LTTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_MTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_HTotal		0	0	0	0	0	0	0	0
Bus	Business	2025	15	0	2	0	0	0	0	0
Bus	Business	Total	15	0	2	0	0	0	0	0
Bus	Non_business_L	2025	13	0	0	0	0	0	0	0
Bus	Non_business_LTTotal		13	0	0	0	0	0	0	0
Bus	Non_business_M	2025	18	0	0	0	0	0	0	0
Bus	Non_business_MTotal		18	0	0	0	0	0	0	0
Bus	Non_business_H	2025	9	0	0	0	0	0	0	0
Bus	Non_business_HTotal		9	0	0	0	0	0	0	0

## TUBA Demonstration Examples



### TOTAL BENEFITS BY DISTANCE

Total benefits (£000s) by distance

Vehicle type	Purpose	Year	< 1 kms	1 to 5 kms	5 to 10 kms	10 to 15 kms	15 to 20 kms	20 to 50 kms	50 to 100 kms	>100 kms
Car	Business	2025	0	-6	-268	0	0	0	0	0
Car	Business	Total	0	-6	-268	0	0	0	0	0
Car	Non_business_L	2025	0	-9	-372	0	0	0	0	0
Car	Non_business_LTotal		0	-9	-372	0	0	0	0	0
Car	Non_business_M	2025	0	-9	-452	0	0	0	0	0
Car	Non_business_MTotal		0	-9	-452	0	0	0	0	0
Car	Non_business_H	2025	0	-7	-358	0	0	0	0	0
Car	Non_business_HTotal		0	-7	-358	0	0	0	0	0
LGV Freight	Business	2025	0	-7	-269	0	0	0	0	0
LGV Freight	Business	Total	0	-7	-269	0	0	0	0	0
LGV Freight	Non_business_L	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_LTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_M	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_MTotal		0	0	0	0	0	0	0	0
LGV Freight	Non_business_H	2025	0	0	0	0	0	0	0	0
LGV Freight	Non_business_HTotal		0	0	0	0	0	0	0	0
OGV1	Business	2025	0	-2	-107	0	0	0	0	0
OGV1	Business	Total	0	-2	-107	0	0	0	0	0
OGV1	Non_business_L	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_LTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_M	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_MTotal		0	0	0	0	0	0	0	0
OGV1	Non_business_H	2025	0	0	0	0	0	0	0	0
OGV1	Non_business_HTotal		0	0	0	0	0	0	0	0
Bus	Business	2025	15	1	4	0	0	0	0	0
Bus	Business	Total	15	1	4	0	0	0	0	0
Bus	Non_business_L	2025	13	0	0	0	0	0	0	0
Bus	Non_business_LTotal		13	0	0	0	0	0	0	0
Bus	Non_business_M	2025	18	0	0	0	0	0	0	0
Bus	Non_business_MTotal		18	0	0	0	0	0	0	0
Bus	Non_business_H	2025	9	0	0	0	0	0	0	0
Bus	Non_business_HTotal		9	0	0	0	0	0	0	0

### SENSITIVITY

Total user benefits as a percentage of total DM user costs

Modelled Years

Mode	2025
Road	-36.27%
Bus	3.09%

## TUBA Demonstration Examples



### Economy:Economic Efficiency of the Transport System(TEE)

Consumer - Commuting user benefits	All Modes	Road	Bus	
Travel Time	193	154	40	
Vehicle operating costs	59	59	0	
User charges	-1419	-1419	0	
During Construction & Maintenance	0	0	0	
NET CONSUMER - COMMUTING BENEFITS	-1167	-1207	40	
Consumer - Other user benefits	All Modes	Road	Bus	
Travel Time	0	0	0	
Vehicle operating costs	0	0	0	
User charges	0	0	0	
During Construction & Maintenance	0	0	0	
NET CONSUMER - OTHER BENEFITS	0	0	0	
Business	All Modes	Road Personal	Road Freight Bus Personal	Bus Freight
Travel Time	329	227	85 17	0
Vehicle operating costs	26	11	13 2	0
User charges	-995	-512	-483 0	0
During Construction & Maintenance	0	0	0 0	0
Subtotal	-640	-275	-385 20	0
Private Sector Provider Impacts				
Revenue	537	0	537	
Operating costs	0	0	0	
Investment costs	0	0	0	
Grant/subsidy	0	0	0	
Subtotal	537	0	537	
Other business Impacts				
Developer contributions	0	0	0	
NET BUSINESS IMPACT	-103			
TOTAL				
Present Value of Transport Economic Efficiency Benefits (TEE)		-1270		

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2002, in 2002 prices

## TUBA Demonstration Examples



### Public Accounts

Local Government Funding	ALL MODES	Road	Bus
Revenue	-2524	-2524	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	-2524	-2524	0

Central Government Funding: Transport	ALL MODES	Road	Bus
Revenue	0	0	0
Operating costs	0	0	0
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
NET IMPACT	0	0	0

### Central Government Funding: Non-Transport

Indirect Tax Revenues	403	311	92
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### TOTALS

Broad Transport Budget	-2524	-2524	0
Wider Public Finances	403	311	92

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2002, in 2002 prices

### Analysis of Monetised Costs and Benefits

Greenhouse Gases	9
Economic Efficiency: Consumer Users (Commuting)	-1167
Economic Efficiency: Consumer Users (Other)	0
Economic Efficiency: Business Users and Providers	-103
Wider Public Finances (Indirect Taxation Revenues)	-403
Present Value of Benefits (PVB)	-1664
 Broad Transport Budget	 -2524
Present Value of Costs (PVC)	-2524
 OVERALL IMPACTS	  
Net Present Value (NPV)	860
Benefit to Cost Ratio (BCR)	0.659

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.