

## Summary:

# Transport Cost-Benefit Analysis: Parameters, Unit Costs and Indices

## Introduction

The Norwegian Public Roads Administration is revising its cost benefit analysis (CBA) manual and the accompanying unit costs. In relation to this work, the Institute of Transport Economics (TØI) has provided a series of parameters, unit costs and indices for updating the costs, which are presented in this report. This is one of two TØI reports contributing to this revision. The other is TØI report 798/2005 (Minken and Samstad, 2005), which provides the framework for multimodal CBA.

The present report covers:

- Vehicle operating costs for light vehicles, heavy vehicles and buses
- Indices for updating the vehicle operating costs as well as other unit costs in the CBA manual
- Assessment of the travel purpose distribution
- Assessment of car occupancy rates

Transport CBA practitioners and software programmers for the Public Roads Administration will here find unit costs and parameters in one place. They will also find recommended indices for updating the unit costs to future price levels. Further, the description of how the unit costs and parameters were estimated will be of use in later revisions.

It should be noted that the costs presented in this report are *social costs for use in analyses of transport investments leading to marginal changes in travel distance and travel time*. These are different from the private costs in several ways. E.g., since we are interested in the change of fuel costs when travel distance changes marginally, the fuel cost per kilometre reflects fuel consumption *while driving*, which is different from total fuel costs divided by total vehicle kilometres. The latter would have reflected e.g. cold starts, idling and evaporation.

In the present CBA revision, no new accident and environmental costs or time values were estimated – only adjustments to a new price level were done.

## Vehicle operating costs: Main results

As requested by the Public Roads Administration, figures have been calculated as referred to the 2005 price level. Since, however, the year 2005 was not over at the time of writing, some of the figures are preliminary.

Table S.1. Distance dependent costs, NOK per km. Price level 2005.  
 NOK 1= appr. € 0,125.

Cost	Light vehicles	Lorries	Trucks	Heavy vehicles	Buses
Fuel	0,27	1,39	1,61	1,51	1,51
Fuel (av. 2001-2004)	0,27	1,26	1,46	1,37	1,38
Oil	0,04	0,06	0,08	0,06	0,05
Tyres	0,09	0,38	0,66	0,53	0,32
Maintenance/service	0,58	1,00	1,50	1,28	2,30
Capital costs	0,32				
Depreciation		0,33	0,61	0,49	0,64
<b>Sum</b>	<b>1,30</b>	<b>3,16</b>	<b>4,44</b>	<b>3,89</b>	<b>4,82</b>
<b>Sum (fuel av. 2001-2004)</b>	<b>1,30</b>	<b>3,03</b>	<b>4,29</b>	<b>3,75</b>	<b>4,69</b>

TØI-report 797/2005

Table S.2. Time dependent costs for heavy vehicles and buses, NOK per hour without taxes. Price level 2005. NOK 1= appr. € 0,125.

Cost	Heavy vehicles	Buses
Time dependent part of interest and depreciation	75,81	45,68
Wages	303,00	224,32
Administration	89,52	48,13
<b>Total (without taxes)</b>	<b>468,33</b>	<b>318,13</b>

TØI-report 797/2005

Taxes that should not be included in the results of CBA are included as costs for the user and revenues for the public sector. The principle of entering perceived costs and treating transfers explicitly is what we call the inclusive method. We refer to Minken and Samstad (2005) for further description of the method.

Estimated taxes are attributed to time and distance in the same proportions as the costs to which they relate.

Table S.3. Estimated taxes per kilometre and hour (2005)

	Light vehicles	Heavy vehicles		Buses	
	Distance dependent (NOK/km)	Distance dependent (NOK/km)	Time dependent (NOK/time)	Distance dependent (NOK/km)	Time dependent (NOK/time)
<b>Fuel:</b>					
Petrol tax	0,29*	-	-	-	-
Diesel tax	0,15*	1,00	-	1,00	-
CO <sub>2</sub> tax, petrol	0,06*	-	-	-	-
CO <sub>2</sub> tax, diesel	0,03*	0,17	-	0,18	-
<b>Capital costs:</b>					
Sales tax	0,07	-	-	-	-
Re-registration fee	0,02	0,01	0,54	0,01	0,37
Annual user tax	0,07	0,03	2,03	0,03	2,58

\*: For a car using this fuel type (petrol or diesel)

TØI-report 797/2005

In cases where the agent gets a refund for the value added tax, this tax should not be included at all. This applies to vehicles in business, which is assumed, as a simplification, to be all heavy vehicles and buses as well as 17 percent of vehicle kilometres by light vehicles.

Taxes that were considered relevant in relation to ferries are CO<sub>2</sub> tax (0.52 NOK/litre in 2005) and the sulphur tax (0.07 NOK/litre in 2005).

## Indices for updating unit costs

For updating distance dependent costs for light vehicles we recommend using the consumer price index from Statistics Norway at the relevant sublevel. To update costs for heavy vehicles we recommend using truck cost indices from Statistics Norway. Bus costs should be updated by the indices in the ALFA and BUSSKOST system (Asplan Viak). Costs that are estimated on the basis of willingness-to-pay measures, like accident costs and values of time, should be updated by a wage index. A more detailed overview is given in the report, as well as examples of how to use the indices.

## Travel purpose distribution: Main results

Table S.4. Travel purpose distribution for car (light vehicle), train, bus and plane for travel distances of 100 km or more.

Travel purpose	Car	Train	Bus	Plane
Business trips	0,17	0,14	0,13	0,41
Commuting	0,24	0,07	0,05	0,11
Private trips	0,59	0,79	0,82	0,48

TØI-report 797/2005

Table S.5. Travel purpose distribution for car (light vehicle), train and bus for travel distances shorter than 100 km.

Travel purpose	Car	Train and bus
Business trips	0,17	0,02
Commuting	0,24	0,33
Private trips	0,59	0,65

TØI-report 797/2005

## Car occupancy rate: Main results

Table S.6. Recommended values for car occupancy rate by travel distance and purpose

	Business	To/from work	Other
Trips < 100 km	1,30	1,20	1,85
Trips >= 100 km	1,57	1,27	2,44
All trips	1,38	1,22	2,02

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