

Project Appraisal Guidelines

Unit 6.11 National Parameter Values Sheet

July 2011

Project Appraisal Guidelines

Unit 6.11

National Parameter Values Sheet

Version	Date	Comments
1.0	July 2011	New Guidance

This document is available to download at www.nra.ie/publications/projectappraisal

For further queries please contact:

Strategic Planning Unit
National Roads Authority
St Martin's House
Waterloo Road
Dublin 4

Tel: (01) 660-2511

Email: info@nra.ie

Web: www.nra.ie

1 Introduction

- 1.1. The National Parameters Value Sheet summaries the values for the economic and traffic related parameters to be used in the cost benefit analysis of Irish road schemes.
- 1.2. This document is split into the following sections:
 - Section 2 – Economic parameters; and
 - Section 3 – Traffic input parameters.
- 1.3. Within Section 2 costs are presented as factor or market costs. Market costs include tax and its relationship to factor costs may be defined as follows:

$$\text{Market cost} = 1.191 \times \text{Factor Costs.}$$

2 Economic Parameters

Table 1: Key Parameters

Parameter	Value
Present Value Year	2009
Discount Rate	4% per annum
Appraisal Period	30 years
Consumer Price Index	Available from http://www.cso.ie
Relative Price Factor	1.0

Table 2: Maintenance Costs (Factor Costs, 2009 Prices)

Road Type	COBA Maintenance Type	Maintenance Cost (€1,000/km/year)
Standard 2-lane with H/S	1	18.327
2+1 with central reserve	2	30.023
2+1 without central reserve	1	18.327
Dual Carriageway/Motorway	2,3,4,5,6	41.718

Table 3: Value of Time (VOT) (Factor Costs, 2009 Prices)

Type of Vehicle	Occupant	Journey Purpose	Value in €/Hour
Car	Driver	Working	27.81
	Passenger	Working	27.81
	Driver	Commuting	10.98
	Driver	Other Non-Working Time	9.98
	Passenger	Commuting	10.98
	Passenger	Other Non-Working Time	9.98
LGV	Driver	Working	27.81
	Passenger	Working	27.81
	Driver	Commuting	10.98
	Driver	Other Non-Working Time	9.98
	Passenger	Commuting	10.98
	Passenger	Other Non-Working Time	9.98
Other Goods Vehicles	Driver	Working Time	27.81
Public Service Vehicle	Driver	Working Time	27.81
	Passenger	Working Time	27.81
	Passenger	Commuting	10.98
	Passenger	Other Non-Working Time	9.98

Table 4: Accident Costs (Factor Costs, 2009 Prices)

Cost Per Casualty, €							
Fatality		2,060,099					
Serious injury		231,473					
Minor injury		17,850					
Cost Per Accident, €							
Type	Insurance/ Administration	Damage to Property			Gardai Costs		
		Urban	Rural	M'way	Urban	Rural	M'way
Fatal	378	2,885	4,892	6,223	550	522	763
Serious	234	1,093	1,577	3,754	39	110	103
Minor	144	682	1,106	2,010	18	18	18
Damage Only	72	605	903	868	2	2	1

Table 5: Fuel Costs (Factor Costs, 2009)

Fuel	Price (€ per litre)
Cost of petrol	0.4476
Cost of diesel	0.4451

Table 6: Vehicle Operating Costs (non-Fuel) (Factor costs, 2009 Prices) cents/km

Vehicle Category	Non-Fuel Parameters	
	a ¹	b ¹
Car	6.388	36.783
LGV	11.413	65.599
OGV1	10.623	417.431
OGV2	20.666	804.625
PSV	48.198	1098.877

Table 7: Value of Time Growth Factors (Annual)

Year	Work	Commuting	Leisure
2010	1.000	0.99	0.99
2011	1.000	1.016	1.016
2012 to 2020	1.025	1.020	1.020
2021+	1.020	1.016	1.016

Table 8: Value of Accidents Growth Factors

Year	Annual Growth
2010	0.985
2011	1.020
2012 to 2020	1.025
2021+	1.020

Table 9: Vehicle Operating Costs Growth Rate (Fuel Price Growth)

Period	Annual Growth Rate
2010 to 2030	1.01
2031+	1.00

An annual growth factor of 1.01 equates to a growth of 1% per annum.

Table 10: Vehicle Operating Costs Growth Rate (Non Fuel Price Growth)

Period	Annual Growth Rate
2010 to 2030	0.00
2031+	0.00

Table 11: Vehicle Operating Costs Growth Rates: Fuel Consumption Rate Change

Vehicle	Period	Annual Growth Rate
Cars	2009 - 2024	0.98
Others	2009 - 2024	0.00

Note after 2024 all values are zero.

Table 12: Indirect Tax Rates

Parameter	Indirect Tax Rate%
Average tax on final consumption goods, PETROL	19.1
Tax on fuel final consumption, PETROL	159.6
Tax on fuel intermediate consumption, PETROL	113.7
Tax on non-fuel operating cost, final PETROL	21.5
Tax on non-fuel operating cost, intermediate PETROL	0.0
Average tax on final consumption goods, DIESEL	19.1
Tax on fuel final consumption, DIESEL	133.2
Tax on fuel intermediate consumption, DIESEL (except large PSVs)	91.9
Tax on non-fuel operating cost, final DIESEL	21.5
Tax on non-fuel operating cost, intermediate DIESEL	0.0
Tax on fuel intermediate consumption DIESEL (large PSVs)	133.2

Table 13: Changes in Indirect Tax Rates

Parameter	Period	Tax Rate Change per Annum %
Tax on intermediate petrol	2010	6.5
	2011+	0.0
Tax on final petrol	2010	5.0
	2011+	0.0
Tax on intermediate diesel	2010	10.3
	2011+	0.0
Tax on final diesel	2010	7.9
	2011+	0.0

Table 14: Carbon Cost Forecasts (Factor Prices)

Year of Emission	Price per Tonne Carbon (€)
2009	11.1
2010	11.7
2011	12.3
2012	13.1
2013	14.1
2014	15.1
2015	32.8
2016+	Increase at 5% per annum from 2016

Table 15: Other GHG Costs (Market Prices, 2009)

Emissions Type	Price per Tonne (€)
N ₂ O	4,104
NO _x	6,579
VOC	1,212
PM _{urban}	799,443
PM _{rural}	76,416

3 Traffic Input Parameters

Table 16: Seasonality Index

Network Classification	Number of Sites	Seasonality Index			
		Average*	Minimum	Maximum	Standard Deviation
Motorway (MWY)	14	1.011	0.945	1.045	0.022
National Primary non built-up (TNB)	46	1.058	0.910	1.285	0.072
National Primary built-up (TBU)	1	0.994			
National Secondary non built-up (PNB)	28	1.083	0.899	1.446	0.149
National Secondary built-up (PBU)	2	0.981	0.970	0.988	

* Average value should be used in the absence of local data

Table 17: E-Factor

Network Classification	Number of Data Points	E-Factor			
		Average*	Minimum	Maximum	Standard Deviation
Motorway (MWY)	504	1.218	1.140	1.274	0.026
National Primary non built-up (TNB)	2520	1.180	1.115	1.280	0.027
National Primary built-up (TBU)	72	1.184	1.160	1.206	0.011
National Secondary non built-up (PNB)	1380	1.175	1.098	1.297	0.031
National Secondary built-up (PBU)	60	1.217	1.175	1.243	0.017

* Average value should be used in the absence of local data

Table 18: M-Factor

Month	M-Factor			Standard Deviation
	Average*	Minimum	Maximum	
January	417	347	524	34
February	387	322	489	29
March	382	317	449	21
April	366	309	401	15
May	361	312	400	15
June	361	308	391	15
July	356	285	389	21
August	348	251	407	28
September	359	301	437	17
October	367	321	414	16
November	376	318	488	29
December	419	368	605	36

* Average value should be used in the absence of local data

Table 19: M-Factor Coefficients

Month	Value	
	a	b
January	130	272
February	141	233
March	227	147
April	306	57
May	339	20
June	419	-55
July	540	-174
August	627	-265
September	363	-4
October	251	110
November	115	247
December	153	252

Table 20: Link and Junction Combined Accident Rates

Road type		Accident rate PIA/mvkm	
Motorway		0.026	
Speed Limit		≤ 60 kph	> 60 kph
		PIA/mvkm	PIA/mvkm
2 Lane Single Carriageway		0.202	0.111
Dual Carriageway		0.144	0.056
2+1 without Central Reserve Barrier		0.177	0.098
2+1 with Central Reserve Barrier		0.155	0.084
1 Way		0.148	-

Table 21: Link and Junction Combined Accident Proportions

Road type	Accident proportions					
	Fatal			Serious		Minor
Motorway	0.091			0.091		0.819
Speed limit	≤ 60 kph			> 60 kph		
Casualty severity	Fatal	Serious	Minor	Fatal	Serious	Minor
2 Lane single carriageway	0.049	0.101	0.849	0.093	0.140	0.767
Dual Carriageway	0.022	0.081	0.896	0.068	0.088	0.844
2+1 without Central Reserve Barrier	0.056	0.100	0.844	0.105	0.138	0.757
2+1 with Central Reserve Barrier	0.034	0.103	0.863	0.066	0.147	0.787
1 Way	0.049	0.101	0.850	-	-	-

Table 22: Average Number of Casualties per Accident

Road type	Casualties per PIA					
	Fatal			Serious		Minor
Motorway	0.099			0.116		1.194
Speed limit	≤ 60 kph			> 60 kph		
Casualty severity	Fatal	Serious	Minor	Fatal	Serious	Minor
2 Lane single carriageway	0.057	0.132	1.140	0.106	0.219	1.295
Dual Carriageway	0.025	0.098	1.196	0.075	0.104	1.202
2+1 without Central Reserve Barrier	0.057	0.132	1.140	0.106	0.219	1.295
2+1 with Central Reserve Barrier	0.025	0.098	1.196	0.075	0.104	1.202
1 Way	0.057	0.132	1.140	-	-	-

Table 23: Accident Reduction (β) Factors

Road type	Accident Type	Accident rate reduction factor	
Motorway	1	0.960	
Speed Limit		≤ 60 kph	> 60 kph
2 Lane Single Carriageway	4	0.987	0.966
2+1 without Central Reserve Barrier	5	0.987	0.966
1 Way	8	0.987	0.966
Dual Carriageway	10	0.987	0.966
2+1 with Central Reserve Barrier	11	0.987	0.966
Road type	Accident Type	Casualties per accident change factor: Fatal, Serious, Minor	
Motorway	1	1.012, 0.954, 0.994	
Speed Limit		≤ 60 kph	> 60 kph
2 Lane Single Carriageway	4	1.010, 0.932, 0.989	0.988, 0.929, 0.993
2+1 without Central Reserve Barrier	5	1.010, 0.932, 0.989	0.988, 0.929, 0.993
1 Way	8	1.010, 0.932, 0.989	0.988, 0.929, 0.993
Dual Carriageway	10	1.010, 0.932, 0.989	0.988, 0.929, 0.993
2+1 with Central Reserve Barrier	11	1.010, 0.932, 0.989	0.988, 0.929, 0.993

Table 24: AADT Adjustment Factors

Period of Neutral Month Weekday	Network Classification	Adjustment Factor A(I)			
		LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
12-hour (07:00-19:00)	Motorway	0.981	0.964	1.088	0.981
	National Primary (TNB)	0.990	0.963	1.082	0.926
	National Primary (TBU)	0.979	0.913	0.966	0.851
	National Secondary (PNB)	0.995	0.927	1.013	0.876
	National Secondary (PNU)	0.963	0.848	0.902	0.884
16-hour (06:00-22:00)	Motorway	0.994	0.997	1.076	0.992
	National Primary (TNB)	1.003	0.993	1.094	0.937
	National Primary (TBU)	1.003	0.981	1.041	0.969
	National Secondary (PNB)	0.999	0.972	1.036	0.902
	National Secondary (PNU)	0.997	0.947	0.994	0.959

Table 25: Annual Average Category Proportions by Class of Road

Network Classification	CARS (1)	LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
Motorway (MWY)	83.70%	5.52%	3.14%	6.90%	0.75%
National Primary (TNB)	82.84%	7.95%	4.09%	4.52%	0.60%
National Primary (TBU)	85.94%	8.09%	3.23%	1.84%	0.90%
National Secondary (PNB)	82.62%	9.18%	3.79%	3.63%	0.78%
National Secondary (PBU)	87.20%	7.72%	1.90%	1.98%	1.20%

Table 26: Vehicle Category Proportion Correction Factors

Road Type and Flow Group		Vehicle Type			
		LGV (2)	OGV1 (3)	OGV2 (4)	PSV (5)
Motorway (MWY)	2	1.193	1.305	1.270	1.116
	3	1.082	1.015	0.895	0.880
	4	1.036	0.854	0.713	0.781
	7	0.640	0.514	0.361	0.852
	8	0.598	0.430	0.273	0.706
	9	0.588	0.420	0.271	0.691
National Primary (TNB)	2	1.168	1.211	1.319	1.072
	3	1.102	1.045	0.958	0.908
	4	1.030	0.907	0.727	0.838
	7	0.675	0.621	0.312	1.065
	8	0.624	0.569	0.224	0.863
	9	0.619	0.563	0.198	0.826
National Primary (TBU)	2	1.147	1.237	1.238	1.122
	3	1.082	1.180	0.967	0.916
	4	1.030	1.026	0.753	0.805
	7	0.698	0.691	0.268	0.877
	8	0.666	0.741	0.224	0.775
	9	0.680	0.745	0.198	0.790
National Secondary (PNB)	2	1.158	1.300	1.358	1.080
	3	1.112	1.126	1.049	1.048
	4	1.049	0.898	0.783	0.968
	7	0.680	0.500	0.300	1.015
	8	0.640	0.441	0.255	0.930
	9	0.611	0.399	0.217	0.866
National Secondary (PNB)	2	1.169	1.408	1.394	1.124
	3	1.072	1.074	0.944	1.015
	4	1.046	0.966	0.817	0.899
	7	0.671	0.498	0.274	0.853
	8	0.635	0.429	0.218	0.800
	9	0.580	0.381	0.168	0.721

Table 27: Vehicle Occupancy Rates, by Flow Group and Time Modes

Vehicle Type	Person Mode	Flow Group							
		1	2	3	4	6	7	8	9
Car	Work	1.24	1.25	1.26	1.26	1.33	1.34	1.38	1.38
	Commuting	1.21	1.22	1.23	1.23	1.20	1.23	1.22	1.22
	Other non work	1.64	1.65	1.66	1.68	1.70	1.83	1.85	1.85
LGV	Work	1.36	1.32	1.37	1.38	1.42	1.42	1.42	1.42
	Commuting	1.40	1.41	1.40	1.40	1.95	1.95	1.95	1.95
	Other non work	1.47	1.45	1.49	1.48	2.05	2.05	2.05	2.05
OGV1	Work	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
	Commuting	1.25	1.28	1.24	1.24	1.25	1.25	1.25	1.25
	Other non work	1.29	1.33	1.26	1.27	1.29	1.29	1.29	1.29
OGV2	Work	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
	Commuting	1.11	1.14	1.11	1.08	1.11	1.11	1.11	1.11
	Other non work	1.13	1.12	1.11	1.16	1.13	1.13	1.13	1.13
PSV	Work	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
	Commuting	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Other non work	9.35	9.35	9.35	9.35	9.35	9.35	9.35	9.35

Table 28: Vehicle Proportions by Time Mode and Flow Group

Vehicle Type	Person Mode	Flow Group							
		1	2	3	4	6	7	8	9
Car	Work	10.3%	16.9%	13.3%	12.0%	4.5%	1.8%	2.7%	2.7%
	Commuting	42.2%	36.7%	44.2%	42.9%	24.2%	7.9%	6.5%	6.5%
	Other non work	47.5%	46.4%	42.5%	45.1%	71.3%	90.3%	90.9%	90.9%
LGV	Work	50.3%	50.3%	41.3%	40.2%	50.3%	50.3%	50.3%	50.3%
	Commuting	35.1%	35.1%	45.2%	45.1%	35.1%	35.1%	35.1%	35.1%
	Other non work	14.6%	14.6%	13.5%	14.7%	14.6%	14.6%	14.6%	14.6%
OGV1	Work	81.3%	81.3%	76.6%	75.6%	81.3%	81.3%	81.3%	81.3%
	Commuting	11.1%	11.1%	16.1%	17.0%	11.1%	11.1%	11.1%	11.1%
	Other non work	7.5%	7.5%	7.2%	7.4%	7.5%	7.5%	7.5%	7.5%
OGV2	Work	86.9%	86.9%	82.5%	79.7%	86.9%	86.9%	86.9%	86.9%
	Commuting	7.8%	7.8%	11.7%	13.2%	7.8%	7.8%	7.8%	7.8%
	Other non work	5.3%	5.3%	5.8%	7.2%	5.3%	5.3%	5.3%	5.3%
PSV	Work	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
	Commuting	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%
	Other non work	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%	70.8%