

Annex 5: Subsidy level indicators for the case studies

‘Environmentally Harmful Subsidies: Identification and Assessment’

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Results of Task 3a

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1 CASE STUDIES IN THE TRANSPORT SECTOR

1.1 Fuel tax differentiation

1.1.1 Value indicators

Tax expenditure

Conversion factors used:

Kilograms of motor fuel per litre

	kg/cu.m	kg/l
Petrol	737,22	0,737
Diesel	850,00	0,850

Source http://www.simetric.co.uk/si_liquids.htm

Ktoe per kilogram of motor fuel

	kg	kgoe	ktoe
Petrol	1	1,051	0,000001051
Diesel	1	1,010	0,000001010

Source: DG Energy and Transport. 2009. EU Energy and Transport In Figures. p. 23.
http://ec.europa.eu/energy/publications/statistics/doc/2009_energy_transport_figures.pdf

	ktoe	kg	litres
Petrol	1	951.475	1.291.011
Diesel	1	990.099	1.164.822

CO2 emissions per litre of diesel burned (kg) = 2,67

CO2 emissions from a gallon of diesel = 2,778 grams x 0.99 x (44/12) = 10,084 grams = 10.1 kg/gallon = 22.2 pounds/gallon

Source: U.S. Environmental Protection Agency. Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel.

<http://www.epa.gov/otaq/climate/420f05001.htm#calculating>

1 gallon [US, liquid] = 3.785 411 784 liter

source: <http://www.onlineconversion.com/volume.htm>

Diesel prices, fuel excise taxes and non-commercial diesel subsidy

	EUR per litre			
	Total price (diesel)	Excise tax		Diesel subsidy
		Petrol	Diesel	
Country				
UK	1,17	0,66	0,66	-
Austria (AT)	0,95	0,46	0,36	0,10
Netherlands (NL)	1,04	0,70	0,42	0,28

Fuel price source: AA Ireland (2009). International Petrol Prices: May 2009.
<http://www.aaireland.ie/petrolprices/>

Excise tax source: DG TAXUD Excise Tax Tables

Diesel fuel sales in Austria, the Netherlands and the UK, 2006

	Diesel sales 2006 (ktoe)	% of sales that are non-commercial	Non-commercial sales (ktoe)	kg	litres
conversion factors			1	990,099	1,164,822
AT	4,523	25%	1,131	1,119,554,455	1,317,122,889
NL	6,950	25%	1,738	1,720,297,030	2,023,878,858
UK	22,369	25%	5,592	5,536,881,188	6,513,977,868

Sources:

Fuel sales figures from DG Energy and Transport. 2009. p. 219. EU Energy and Transport In Figures. http://ec.europa.eu/energy/publications/statistics/doc/2009_energy_transport_figures.pdf

Non-commercial %-of-sales assumption based on Kohlhaas, M., K. Schumacher, J. Diekmann, M. Cames and D. Schumacher. 2004. Economic, Environmental and International Trade Effects of the EU Directive on Energy Tax Harmonization. DIW Berlin, German Institute for Economic Research. Discussion Paper 462.

a) Revenue foregone method

	Austria	Netherlands	UK
	(medium case)	(high case)	(low case)
Baseline tax rate (petrol; EUR per litre in 2009)	0.46	.70	.66
Reduced tax rate (diesel; EUR per litre in 2009)	0.36	.42	.66
Value of non-commercial diesel consumption (2006 sales volume times 2009 prices; in EUR)	1,251,266,744	2,104,834,013	7,621,354,106
Revenue foregone (EUR)	128,419,482	571,179,091	0

b) Revenue gain method:

- Elasticity of demand:

Volume of fuel consumed: -0.25 within a year; -0.6 in about 5 years¹

	Austria (AT)	Netherlands (NL)	UK
% change in diesel price with removal of subsidy	10.3%	27.1%	0%
Short-term elasticity (1 year)	- 0.25	- 0.25	- 0.25
Longer-term elasticity (5 year)	- 0.60	- 0.60	- 0.60
Short-term % reduction in diesel consumption	-2.6%	-6.8%	0.0%

¹ Goodwin, Dargay and Hanly (2004) found the following price effects: If the real price of fuel rises by 10% and stays at that level, the result is a dynamic process of adjustment such that the following occur: (a) Volume of traffic will fall by roundly 1% within about a year, building up to a reduction of about 3% in the longer run (about 5 years or so).; (b) Volume of fuel consumed will fall by about 2.5% within a year, building up to a reduction of over 6% in the longer run.

Longer-term % reduction in diesel consumption	-6.2%	-16.3%	0.0%
Litres of subsidised diesel sold	1,317,122,889	2,023,878,858	6,513,977,868
Litres of unsubsidised diesel sold (short-term)	1,283,328,288	1,886,576,192	6,513,977,868
Litres of unsubsidised diesel sold (longer-term)	1,236,015,848	1,694,352,460	6,513,977,868
Diesel subsidy per litre	0.10	0.28	-
Revenue gain (short-term)	125,124,508	532,429,533	-
Revenue gain (longer-term)	120,511,545	478,180,151	-

c) Marginal social cost

Several negative externalities are associated with vehicle travel. However, many are dependent on the type and weight of vehicle as well as the specific area of travel (e.g. rural, urban, motorway). Due to these complexities, external costs other than costs of climate change will be left out of the analysis. Costs of climate change are a direct function of fuel consumption and are independent of place of emission.

The IMPACT study recommends values for the external costs of climate change as 7 EUR (lower value), 25 (middle value), and 45 (upper value) EUR per tonne of CO₂ emitted.

Burning a litre of diesel produces about 2.62 kg of CO₂

	Austria	Netherlands
Marginal litres of diesel consumed per year (short-term)	33,794,600	137,302,666
Marginal litres of diesel consumed per year (longer-term)	81,107,041	329,526,399
Marginal kilograms of CO ₂ consumed per year (short-term)	90,168,648	366,342,424
Marginal kilograms of CO ₂ consumed per year (longer-term)	216,404,756	879,221,818
Short-term external costs of CO ₂ (~1 year; in EUR at 2006 consumption levels)		
Climate change costs - low	631,181	2,564,397
Climate change costs - med	2,254,216	9,158,561
Climate change costs - high	4,057,589	16,485,409
Longer-term external costs of CO ₂ (~5 years; in EUR, at 2006 consumption levels)		
Climate change costs - low	1,514,833	6,154,553
Climate change costs - med	5,410,119	21,980,545
Climate change costs - high	9,738,214	39,564,982

Summary Table (All figures in EUR)

	Austria	Netherlands	UK
	(medium case)	(high case)	(low case)
Revenue foregone	128,419,482	571,179,091	0
Revenue gain (short-term)	125,124,508	532,429,533	0
Revenue gain (longer-term)	120,511,545	478,180,151	0
Short-term external costs of CO ₂ (~1 year; in EUR at 2006 consumption levels)			
Climate change costs - low	631,181	2,564,397	0

Climate change costs - med	2,254,216	9,158,561	0
Climate change costs - high	4,057,589	16,485,409	0
Longer-term external costs of CO2 (~5 years; in EUR, at 2006 consumption levels)			
Climate change costs - low	1,514,833	6,154,553	0
Climate change costs - med	5,410,119	21,980,545	0
Climate change costs - high	9,738,214	39,564,982	0

d) Total annual subsidy value

- *With revenue foregone method*: €128 million for Austria; EUR €571 million for the Netherlands
- *With revenue gain method*: €125 million over the short term for Austria (€120 million over the longer term); €532 million over the short term for the Netherlands (€478 million over the longer term)
- *Climate-change costs via MSC method (short term)*: an additional €630,000 to €4.1 million for Austria; an additional €2.6 million to €16.5 million for the Netherlands
- *Climate-change costs via MSC method (longer term)*: an additional €1.5 million to €9.8 million for Austria; an additional €6.1 million to €40 million for the Netherlands

1.1.2 Percentage indicators

The following percentage indicators show the total diesel subsidy as a percentage of total annual diesel consumption and as a percentage of total excise revenues collected at present (i.e. with the subsidy in place). The figures show the lowest scenario (revenue gain method and lowest climate-cost scenario over the longer term) and the highest scenario (revenue foregone method and highest climate-cost scenario over the longer term).

	Austria		The Netherlands	
	lowest	Highest	lowest	highest
Subsidy as % of total annual diesel cost (also includes climate costs)	9,8%	11%	23,0%	29%
Subsidy as % of total excise revenues (not including climate costs)	25,3%	27%	56,5%	67%

Summary of assessing the level of subsidization of diesel excise tax subsidies

Austria

The total value of annual tax-expenditure subsidies to drivers of diesel vehicles in Austria is estimated to be **between €129 million and €138 million**, including the costs of climate change. Of this, €128 million is due to foregone tax revenue and €630,000 to €9.8 million is due to climate-change costs associated with subsidy-induced driving behaviour. Removing the diesel excise-tax subsidy would on average increase the cost of driving a diesel vehicle in Austria by 10% and increase diesel fuel-tax revenue by about 26%.

The Netherlands

The total value of annual tax-expenditure subsidies to drivers of diesel vehicles in the Netherlands is estimated to be **between €574 million and €611 million**, including the costs of climate change. Of this, €571 million is due to foregone tax revenue and €2.6 million to €143 million is due to climate-change costs associated with subsidy-induced driving behaviour. Removing the diesel excise-tax subsidy would on average increase the cost of driving a diesel vehicle in the Netherlands by about 26% and increase diesel fuel-tax revenue by 62%.

The UK

The United Kingdom taxes petrol and diesel at the same rate per litre (66 EUR cents), which means that **relative to petrol, diesel is not subsidised on a per-litre basis**.

1.2 Company car taxation in the Netherlands

1.2.1 Value indicators

a) Revenue-foregone method:

Economic theory indicates that the optimal taxation level of car company as fringe benefits must be based on the firms' net costs of providing a car (excluding costs of running a car for business purposes) not the purchase price. When company car is not used for business, the net costs are equal to gross costs.

The implicit price subsidy is:

Implicit price subsidy = annual net cost of providing a car – calculated taxable income for employee with company car

Given:

- Annual net costs of providing a car = 8,700€ (Note 1)
- Average purchase price of a company car in the Netherlands (2007) = 17,000€
- Fringe benefit taxation levels: 22% until 2008 of the car's catalogue value is considered part of the employee/user's income. In 2008: 25% of the car's catalogue value is considered part of the employee/user's income. For 'very clean' cars (CO₂ < 110 g/km for petrol/LPG and < 95 g/km for diesel) the tax rate was reduced to 14%. More recently, in January 2009, the taxable income from 'clean' cars (CO₂ < 140 g/km for petrol/LPG and < 116 g/km for diesel) was reduced to 20% of the value of the car. This measure increased the range of cars that are eligible for lower taxation.

Calculations:

For cars above 140gCO₂/km:

- Annual value added to employees income for tax purposes = 17,000€*0,25 = 4,250€
- **Annual price subsidy = 8,700€ - 4,250€ = 4,450€**

For cars between 110 and 140 gCO₂/km:

Note: we assume the average price for cleaner cars is the same as average.

- Annual value added to employees income for tax purposes = $17,000€ \times 0,20 = 3,400€$
- **Annual price subsidy = $8,700€ - 3,400€ = 5,300€$**

For cars below 110gCO₂/km:

Note: we assume the average price for cleaner cars is the same as average.

- Annual value added to employees income for tax purposes = $17,000€ \times 0,14 = 2,380€$
- **Annual price subsidy = $8,700€ - 2,380€ = 6,320€$**

The implicit price subsidy given to employees is equal to 4,450€ annually for company cars above 140gCO₂/km, 5,300€ for 'clean' cars and 6,320€ for 'very clean' cars.

The annual net costs of owning a car is about double than what the employee pays for under the current taxation scheme (for (very) clean cars employees get a greater discount).

The non distortionary percentage of car value that should be considered as taxable income is 51% ($8,700/17,000$), much higher than 25%.

Notes:

(1) The annual net cost used is based on the following assumptions: the car is leased (more than 70% of company cars in the NL). The costs are calculated on the assumption that the car is not used for business purposes (purchase and costs would be slightly higher) (this is the case for 78% of company cars in the NL). This implies an average purchase price of €17,000. The annual cost include: a) *annual* lease price of the car is €3,700; b) on average, company-car owners drive about 17,000 *private* kilometres per year; c) the sum of the fuel and depreciation costs per kilometre of a representative company car is estimated to be about €0.15, consequently the variable *private* costs are estimated to be €2,550 (that is, $€0.15 \times 17,000$ km); the insurance premium is annual, €1,700; d) free road assistance is rather negligible, at €69.50; e) the vehicle user tax, which reflects the costs of road usage, is dependent on residence province and on weight, on average amounts to €2,500 annually. Therefore the total costs are €8,700 (that is, $€3,700 + €2,550 + €2,500$). (Taken from Gutierrez-i-Puigarnau and van Ommeren (2009). NB: G&O seem to have omitted the € 1,700 insurance premium from their calculation, so the actual costs may be even higher.

b) The taxes foregone for the income tax advantage:

Value of annual tax foregone per company car = Implicit price subsidy * marginal income tax

Given:

- Marginal income tax brackets: 42% (income from EUR 32,127 to EUR 54,776) ; above that: 52 %.
- Annual price subsidy for ownership of a car = 4,450€ (for cars above 140gCO₂/km)
- Annual price subsidy = 5,300€ (for cars between 110 and 140 gCO₂/km)

- Annual price subsidy = 6,320€ (for cars below 110gCO₂/km)

Calculations:

a) For cars above 140gCO₂/km:

- Value of tax foregone = 4,450€*0,42 = 1,869€ (middle income tax bracket)
- Value of tax foregone = 4,450€*0,52 = 2,314€ tax foregone (higher income tax bracket)

b) For cars between 110 and 140 gCO₂/km:

- Value of tax foregone = 5,300€*0,42 = 2,226€ (middle income tax bracket)
- Value of tax foregone = 5,300€*0,52 = 2,756€ tax foregone (higher income tax bracket)

c) For cars below 110gCO₂/km :

- Value of tax foregone = 6,320€*0,42 = 2,654€ (middle income tax bracket)
- Value of tax foregone = 6,320€*0,52 = 3,286€ tax foregone (higher income tax bracket)

For 'standard' cars the value of taxes foregone is between 21.48% (1869€) and 26.59% (2314€) of total net annual cost of ownership due to the level of taxation of company cars as a fringe benefit. For 'cleaner' cars the revenue foregone is higher.

c) *The tax foregone (including VAT on purchase and repairs (which the company car users do not pay for)*

Annual value of VAT on purchase and repairs = annual net cost of car ownership*(VAT rate* share of purchase and repairs in total net cost

Given:

- Standard VAT = 19%
- Cost of purchase and repairs = 40% of total annual costs of owning a car

Calculations:

(8,700€*0,19*0,40) = 661€ is the annual VAT tax advantage = 8% of annual costs of owning a car

a) For cars above 140gCO₂/km:

- 1,869€ + (8,700€*0,19*0,40) = 1,869€+661€ = **2,530€ Total value of tax foregone, including non payment of VAT for purchase and repairs** (middle income tax bracket)
- 2,314€ + (8,700€*0,19*0,40) = 2,314€+661€ = **2,975€ Total value of tax foregone, including non payment of VAT for purchase and repairs** (higher income tax bracket)

Considering therefore, in addition to the income tax advantage, the non payment of VAT for purchase and repairs, results in a total value of tax foregone between **2,530€ (29% of annual cost of owning a car) and 3,191€ (37% of annual cost of owning a car).**

b) For cars between 110 and 140 gCO₂/km:

- $2,226€ + (8,700€ * 0,19 * 0,40) = 2,226€ + 661€ = 2,887€$ **Total value of tax foregone, including non payment of VAT for purchase and repairs** (middle income tax bracket)
- $2,756€ + (8,700€ * 0,19 * 0,40) = 2,756€ + 661€ = 3,417€$ **Total value of tax foregone, including non payment of VAT for purchase and repairs** (higher income tax bracket)

c) For cars below 110gCO₂/km:

- Value of tax foregone = $2,654€ + 661€ = 3,315€$, including non payment of VAT for purchase and repairs (middle income tax bracket)
- Value of tax foregone = $3,286€ + 661€ = 3,947€$, including non payment of VAT for purchase and repairs (higher income tax bracket)

The total tax foregone by the government

Given:

873, 091 = number of company cars in the NL in 2008

12,100 = number of very clean cars registered in 2008 (1.3% of total fleet)

If all company cars were taxed at the same rate (25%), the tax revenue foregone would be between:

- $2,530€ * 873, 091 = 2,208,920,230 €$ and
- $2,975€ * 873, 091 = 2,597,445,725 €$.

Assuming that 10% of the company car fleet is 'clean' and 5% is 'very clean', the revenue foregone is between:

- $(2,530€ * 0.85 + 2,887 * 0.10 + 3,315 * 0.05) * 873, 091 = 2,274,358,400 €$ and
- $(2,975€ * 0.85 + 3,417 * 0.10 + 3,947 * 0.05) * 873, 091 = 2,678,468,570 €$.

The additional tax loss attributable to the introduction of discounts for cleaner cars is between 65 and 81 million €.

d) Marginal social cost

The impacts on the environment of the special tax treatment of company cars is due to the following impacts compared to the counterfactual situation (in which employees do not receive a company car for private use and commuting but receive a higher wage):

- a) Drivers drive longer distances than they would if no company car was provided
- b) Drivers drive a larger car than they would otherwise
- c) There are more cars around than there would be otherwise

Additional kilometres driven

- Business travel: For the purposes of this assessment, we assume that travel by company car for business purposes is the most effective way of getting to destination.
- Private travel: We assume that the impact on private mileage is very little as a reduction in variable costs for higher income groups has a smaller impact: Gutierrez-i-Puigarnau and van Ommeren (2009) find no impact on work days travel and only a small impact (330km/year) on weekend days.
- Commuting: There is instead an impact on commuting distances. Data on this vary. Graus W. and Worrel E. (2008) review of the data for 2005 reveal that on average, a company car travels an additional 7,100 km/year for commuting, almost double the distance travelled for the same purpose by private cars. The impact in terms of CO₂ of this average additional mileage is around 1,14 tCO₂ per company car (average gCO₂/km 160), or around 0,9 MtCO₂ if we spread the number to all company cars (873,091, CBS 2008). The effects of company car taxation on an increase in commuting distances is estimated by Gutierrez and van Ommeren (2009) to be limited to 1,200 km per year with respect to the counterfactual. Additional travel for private and commuting purposes are estimated to account for a welfare loss of 200€ per year per company car (of which 100€ for the externalities).

The effects of company car taxation on an increase in commuting distances are:

- **174,618,200€ per year in welfare losses of which 87,309,100€ in external costs** (using € 0.08/km for external costs as used in Small and Verhoef, 2007 – used in Gutierrez-i-Puigarnau and van Ommeren (2009)).
- **Using the IMPACT project values to calculate the externalities linked to the additional commuting by car (0.367€/km peak time for urban areas; 0.133€/km peak time for interurban areas), we calculate the impact of additional commuting in rush hours (1,200km * external cost factor) to be between 159.6€ (interurban areas) and 440.4€ (urban areas) per company car per year. In total, the costs for the whole company car fleet are between 139,345,324 € and 384,509,276€ per year.**

Table: External cost per unit Euro cent/vkm for Germany

Cost component		Passenger car	Heavy duty vehicle (HDV)
€/t/vkm		Unit costs (bandwidths)	Unit costs (bandwidths)
Noise	Urban, day	0.76 (0.76 - 1.85)	7.01 (7.01 - 17.01)
	Urban, night	1.39 (1.39 - 3.37)	12.8 (12.8 - 31)
	Interurban, day	0.12 (0.04 - 0.12)	1.1 (0.39 - 1.1)
	Interurban, night	0.22 (0.08 - 0.22)	2 (0.72 - 2)
Congestion	Urban, peak	30 (5 - 50)	75 (13 - 125)
	Urban, off-peak	0 (-)	0 (-)
	Interurban, peak	10 (0 - 20)	35 (0 - 70)
	Interurban, off-peak	0 (-)	0 (-)
Accidents	Urban	4.12 (0 - 6.47)	10.5 (0 - 13.9)
	Interurban	1.57 (0 - 2.55)	2.7 (0 - 3.5)
Air pollution	Urban, petrol	0.17 (0.17 - 0.24)	(-)
	Urban, diesel	1.53 (1.53 - 2.65)	10.6 (10.6 - 23.4)
	Interurban, petrol	0.09 (0.09 - 0.15)	(-)
	Interurban, diesel	0.89 (0.89 - 1.8)	8.5 (8.5 - 21.4)
Climate change	Urban, petrol	0.67 (0.19 - 1.2)	(-)
	Urban, diesel	0.52 (0.14 - 0.93)	2.6 (0.7 - 4.7)
	Interurban, petrol	0.44 (0.12 - 0.79)	(-)
	Interurban, diesel	0.38 (0.11 - 0.68)	2.2 (0.6 - 4)
Up- and downstream processes	Urban, petrol	0.97 (0.97 - 1.32)	(-)
	Urban, diesel	0.61 (0.61 - 1.05)	3.1 (3.1 - 6.9)
	Interurban, petrol	0.65 (0.65 - 1.12)	(-)
	Interurban, diesel	0.45 (0.45 - 0.92)	2.7 (2.7 - 6.7)
Nature & landscape	Urban	-	0 (0 - 0)
	Interurban	0.4 (0 - 0.4)	1.15 (0 - 1.15)
Soil & water pollution	Urban/interurban	0.06 (0.06 - 0.06)	1.05 (1.05 - 1.05)
Total			
Urban	Day, peak	36.7 (7.1 - 61.1)	109.8 (35.5 - 192)
	Day, off-peak	6.7 (2.1 - 11.1)	34.8 (22.5 - 67)
	Night, off-peak	7.4 (2.8 - 12.7)	40.6 (28.2 - 80.9)
Interurban	Day, peak	13.3 (1 - 25.2)	54.4 (13.3 - 109)
	Day, off-peak	3.3 (1 - 5.2)	19.4 (13.3 - 39)
	Night, off-peak	3.4 (1 - 5.3)	20.3 (13.6 - 39.9)

Source: M. Maibach, C. Schreyer, D. Sutter (INFRAS); H.P. van Essen, B.H. Boon, R. Smokers, A. Schroten (CE Delft); C. Doll (Fraunhofer Gesellschaft – ISI); B. Pawlowska, M. Bak (University of Gdansk), Handbook on estimation of external costs in the transport sector Internalisation Measures and Policies for All external Cost of Transport (IMPACT), Version 1.1, Delft, CE, 2008

Accounting for the difference in the type of cars

Taken from Gras W. and Worrel. E, 2008: ‘The fuel consumption on a per km basis for company cars is slightly lower than the fuel consumption for private cars. The reason is that company cars more often consume diesel fuel than gasoline. 47% of the company cars consume diesel in comparison to 10% of the private cars in 2005. Diesel cars are currently more energy efficient than gasoline cars. This effect is largely compensated by the fact that company cars are larger; 60% of the company cars can be referred to as large cars in comparison to 35% of private cars. If the average size of company cars is the same as the average size of private cars the energy savings amount to 4 PJ or 1.5% of the total energy consumption of passenger cars.’

As we have seen in the case study on fuel taxation (diesel vs. petrol), it is doubtful if the use of diesel reduces fuel consumption and CO₂ emissions at all. Moreover, diesel cars have higher rates of other emissions, such as NO_x and particulates. As a result, the external costs of transport by diesel fueled vehicles are generally higher than in case of petrol fueled vehicles. The ExternE estimates show a wide range of estimates for this difference, depending on the country and the circumstances (e.g. intra or inter urban transport). Taking the lowest value for this difference (about € 0.10 per 100 passenger kilometres), a rough estimate could be calculated as follows. Assuming that without the subsidy 37% of the current company car fleet would switch from diesel to petrol, this would mean 323,044 cars. If each of these cars drives 15,000 km per year with 1.5 passenger, the total travel involved would amount to 7,268,482,575 passengerkm, implying that external costs of € **73 million** would be avoided in the

counterfactual case.

There are more cars around that there would be otherwise

Impact on numbers of cars in households: Gutierrez-i-Puigarnau and van Ommeren (2009) consider the (long-run) *fuel price* elasticity of ownership, which is around -0.25 (Goodwin et al., 2004; Brons et al., 2006). This suggests that the presence of a company car may increase the number of cars *through free fuel only* by, on average, 25% (-100×-0.25), if all company car owners receive free fuel for private travel. The (long-run) *car price* elasticity of ownership is estimated to be between -0.1 and -0.5 (Johansson and Schipper, 1997; Dargay and Vythoulkas, 1999; Goodwin et al., 2004; Ubbels, 2006), whereas the more elastic estimate is more common and plausible (Trandel, 1991). Using a logit model and a conditional maximum likelihood estimation method, the authors that company car taxation increases the number of cars in the households by a marginal effect of 0.48. The results of the above quoted studies find that company car taxation strongly increases the number of cars in the household.

The main external costs of increased car ownership are those of additional distance driven. Presumably, these are already covered by the figures under point a) above. There are no readily available estimates of the marginal social costs of car ownership as such (in terms of resource use, emissions in car production, end of life disposal etc.).

2 CASE STUDIES IN THE ENERGY SECTOR

2.1 VAT reduction for domestic energy in the UK

2.1.1 Value indicators

a) Revenue foregone method:

- *Definition and identification:* See task 2 output.
- *Baseline tax rate:* 17.5% (see note 1).
- *Reduced tax rate:* 5%.
- *Value of subsidized activity:* EUR 31.4 billion (excl. VAT) (see note 2).
- *Revenue foregone:* EUR 3.9 billion (see note 3).

b) Revenue gain method:

- *Elasticity of demand:* -0.30 for electricity; -0.35 for gas, oil and coal (see note 4).
- *Value of unsubsidized activity:* EUR 30.1 billion (excl. VAT) (see note 5).
- *Revenue foregone:* EUR 3.8 billion (see note 6).

c) Marginal social cost

- *Main elements of marginal social (=external) cost:* related to emissions of CO₂, PM and SO₂.
- *Quantification method:* for electricity: direct (EUR per kWh); for gas, oil and coal: indirect (EUR per tonne of emissions) (see note 7).
- *Calculated external cost:* EUR 144 million (see note 8).

d) Total subsidy value

- *With revenue foregone method:* EUR 4.0 billion.
- *With revenue gain method:* EUR 3.9 billion.

2.1.2 Percentage indicators

Subsidy as % of total annual energy cost for households: 11.9 (see note 9).

Subsidy as % of total VAT revenues: 3.0 (see note 10)

Summary

Annual implicit subsidies by reduced VAT for domestic energy users can be estimated at a total **€3.9 billion to €4.0 billion**. Of this, €3.8 billion to €3.9 billion is due to foregone tax revenue and €144 million is due to externalities associated with external costs due to subsidy-induced energy consumption. Removing the subsidy would on average increase the cost of residential energy consumption in the UK by almost 12%.

Notes:

(1) The current standard VAT rate is reduced to 15%, but this is a temporary measure, part of the UK's economic stimulus package and due to end by the end of 2009.

(2) Residential **electricity** consumption: 116.4 TWh in 2006 (IEA, 2008a).
Average electricity price for households in 2006 (excl. VAT): GBP 0.0964 per kWh (IEA, 2009) = EUR 0.14 per kWh (using average exchange rate for 2006).

Value of subsidized electricity use: $116.4 \times 0.14 = \text{EUR } 16.3 \text{ billion}$ (excl. VAT).

Residential **gas** consumption: 28.2 Mtoe in 2006 (IEA, 2008a).

Average gas price for households in 2006 (excl. VAT): GBP 332.93 per 10^7 kcal (IEA, 2009) = EUR 482.75 per toe (using average exchange rate for 2006; 1 toe = 10^7 kcal).

Value of subsidized gas use: $28.2 \times 0.48275 = \text{EUR } 13.6 \text{ billion}$ (excl. VAT).

Residential **oil** consumption: 3.03 Mtoe in 2006 (IEA, 2008a).

Average oil price for households in 2006 (excl. VAT): GBP 0.34915 per litre (IEA, 2009) = EUR 430 per toe (using average exchange rate for 2006; 1 toe = 1180 litres of light fuel oil).

Value of subsidized oil use: $3.03 \times 0.43 = \text{EUR } 1.3 \text{ billion}$ (excl. VAT).

Residential **coal** consumption: 0.53 Mtoe in 2006 (IEA, 2008a).

Average coal price for households in 2006 (excl. VAT): GBP 0.1865 per kg (IEA, 2009) = EUR 386 per toe (using average exchange rate for 2006; 1 toe = 1429 kg of coal).

Value of subsidized coal use: $0.53 \times 0.386 = \text{EUR } 0.2 \text{ billion}$ (excl. VAT).

Total value of subsidized residential energy use: **EUR 31.4 billion** (excl. VAT).

(3) $(17.5 - 5) = 12.5\%$ of EUR 31.4 billion.

(4) Source: Department of Trade and Industry (cited in Oosterhuis et al., 2008). Elasticity for oil and coal assumed equal to that of gas. Long term elasticities may be higher (in absolute terms).

(5) Unsubsidized demand for electricity is $0.3 \times 12.5 = 3.75\%$ lower; value of unsubsidized electricity use is $0.9625 \times 16.3 = \text{EUR } 15.7 \text{ billion}$. Unsubsidized demand for gas, oil and coal is $0.35 \times 12.5 = 4.375\%$ lower; value of unsubsidized use of these fuels is $0.95625 \times (13.6 + 1.3 + 0.2) = \text{EUR } 14.4 \text{ billion}$.

Total value of (counterfactual) unsubsidized residential energy use: **EUR 30.1 billion** (excl. VAT).

(6) $(17.5 - 5) = 12.5\%$ of EUR 30.1 billion.

(7) The average external cost for electricity, **EUR 0.026 per kWh**, has been calculated as a weighted average, using the ExternE estimates for the UK and the share of energy sources in the UK's electricity production in 2006. See table below.

Source for electricity production	External cost in EUR per kWh (average ExternE figures for UK)	Share (in %) in UK electricity production, 2006 (IEA, 2006)
Nuclear	0.0025	20.3
Coal	0.055	34.1
Oil	0.04	1.2
Gas	0.015	40.6
Combustible renewables and waste	0.01 *	2.0
Other renewables	0.005 **	1.8

* Refers to biomass only.

** Estimate based on ExternE figures for hydro, PV and wind in various countries.

(8) Additional demand for **electricity** due to the subsidy is 3.75% of total residential electricity demand (see note 5). Total residential use was 116.4 TWh in 2006 (IEA, 2008a), of which 4.365 TWh can be attributed to the subsidy. Marginal external cost is $0.026 \times 4,365 = \text{EUR } 116 \text{ million}$. Additional demand for **gas** due to the subsidy is 4.375% of total residential gas demand (see note 5). Total residential use was 33 billion m³ in 2006 (IEA, 2008b); additional gas demand due to the reduced VAT was therefore 1.44 billion m³. Using an emission factor of 1.96 kg CO₂ per m³ gas, this means an additional amount of 2.8 million tonnes of CO₂ emissions. Estimates of the marginal external cost of CO₂ emissions differ widely. According to Tol (2005) they are unlikely to exceed USD 50 per tonne C (and probably much smaller), which is equal to EUR 10 per tonne of CO₂ (given an exchange rate of USD 1.35 per EUR; and given that 1 tonne C equals 0.27 tonnes of CO₂). The marginal external cost of additional CO₂ emissions due to reduced VAT on residential natural gas in the UK can thus be estimated at $10 \times 2.8 = \text{EUR } 28 \text{ million}$. Other external costs (other emissions from natural gas as well as emissions from residential use of oil and coal) are probably negligible.

(9) Calculated as the difference between the standard VAT rate (17.5%) and the reduced rate (5%), divided by the energy costs including VAT (105%).

(10) Total VAT revenues in the UK were EUR 129 billion in 2006 (Eurostat, 2008).

Issues:

The net loss of public revenue may be somewhat lower than the calculated amounts if one takes into account the reduced need for social assistance to households in 'fuel poverty' (defined in the UK as households that need to spend more than 10% of their household income on all domestic fuel use including appliances to heat their home to an adequate level of warmth).

2.2 Fuel tax exemption for biofuels in Germany

2.2.1 Total-value indicators

a) Revenue-foregone method:

1. Definition of the subsidy

The focus of this case study is Germany's 2004 fuel tax exemption for pure and blended biofuels. The tax exemption is an output linked off-budget support mechanism that grants preferential tax treatment for producers of biofuels relative to producers of competing fuels in the economy. Tax exemptions have been used to promote the use of biofuels in Germany since the 1990's but the 2004 exemption expanded the application of this tool from pure biofuels to include blended fuels. See Task 2 for further details.

2. Identification of the tax expenditure programmes: *Identify relevant subsidy programmes (including all government levels (national and sub-national levels), ministries and financing instruments. The following steps must be carried out for each tax expenditure item being evaluated.*

The 2004 fuel tax exemption for pure and blended biofuels represented an amendment to the German Mineral Oil Tax Act (Mineralölsteuergesetz) which is regulated at the Federal level.

3. Identification of the baseline tax rate -- Identify the relevant baseline tax rate (e.g. standard VAT) on comparable activities

The following excise duties for mineral oils applied:

€470.40 per 1000 l for diesel used as propellant

€654.50 per 1000 l for petrol used as propellant

Source: European Commission, (2006)

4. Identification of the reduced tax rate – Identify the tax rate for the subsidised activity of interest (e.g. reduced VAT)

Under the scheme, pure biofuels are fully exempt from the mineral oil duty, ie, a full reimbursement of excise duty applies to biodiesel (€470.40 per 1000 l), vegetable oil (€470.40 per 1000 l) and bioethanol (€654.50 per 1000 l).

For biofuels blended with fossil fuels, the percentage of blended biofuels derived from biomass sources is fully exempt from the mineral oil duty.

Source: European Commission, (2006)

5. Identification of the value of subsidised activity – Identify the total value of the subsidised activity

Total value = Total consumption x Price

Biodiesel

Total consumption = 1,200,000 litres (2004)

Of which, 70% (840,000 l) used in pure form and 30% (360,000 l) used in blended form

Price pure biodiesel = €0.76/l (average 2004 price)

Price blended biodiesel = €0.71/l (average 2004 price)

Total value = € 638,400 + 255,600
= € 894,000

Bioethanol

Total consumption = 82,380 litres (2004)

Price = €0.55 (average 2004-2005 market price)

Total value = € 45,309

Total value of subsidised activity = € 939,309

Source: Federal Government (2005), European Commission (2004), Fachagentur Nachwachsende Rohstoffe e.V. (FNR), (2006),

6. **Calculation of the revenue foregone** – Multiply the total value of the subsidised activity times the tax differential (e.g. standard VAT minus reduced VAT)—this is the so-called “revenue foregone”.

Revenue forgone = Total consumption x Mineral Oil Duty

Biodiesel

Revenue forgone = 1,200,000 l x 470.4 EUR per l
= €564,480,000

Bioethanol

Revenue forgone = 82,380 l x 654.5 EUR per l
= €53,917,710

Total revenue forgone = €618,397,710 (in 2004)

Source: Federal Government (2005), European Commission, (2006), European Commission (2004),

7. **Calculate total subsidy** – Convert currency into standardised terms using exchange rates and correcting for inflation, as appropriate.

Total subsidy = Total revenue forgone = €618,397,710 in 2004

b) Value of marginal social costs (i.e. un-internalised externalities)

There are no readily available estimates or valuation tools for the external costs of biofuels. These costs largely depend on assumptions regarding the type of feedstocks used, the cultivation technique employed, production and distribution processes, and the type of engine in which biofuels are used. Depending on the processes and feedstocks used, social and environmental externalities could range from being significantly negative to positive - a key conundrum related to the use of biofuels. Due to these complexities, the calculation of the marginal social cost of biofuels in Germany was not undertaken for this case study.

2.2.2 Percentage-value indicators

Subsidy as an average % of the price per litre of fuel

$$\text{Biodiesel} = \text{€}0.4704 / \text{€}0.76 = 62\%$$

$$\text{Bioethanol} = \text{€}0.6545 / \text{€}0.55 = 119\%$$

Subsidy as a % of relevant tax collections in 2004

Total revenue from energy excise duties in Germany in 2004 was €41,705,000,000 (Source: European Commission, 2009)

$$\begin{aligned} &= \text{Total revenue forgone} / \text{Total revenue from energy excise duties} \\ &= 618,397,710 / 41,705,000,000 \\ &= 1.48\% \end{aligned}$$

3 CASE STUDIES IN THE WATER SECTOR

3.1 Irrigation subsidies in Spain

3.1.1 Total-value indicators (annual; in constant currency units in cases of time and country comparisons): Value of specified subsidy

- a) Key attributes of the subsidy: see task 2
- b) Value/price of water:
 - **Current water pricing to farmers (as in 2003) in the Community of Irrigators of the Pisuerga Channel (Duero Valley)** €60.59 /ha, equivalent to a volumetric tariff of 0.010 /m³ (from Gómez-Limón and Riesgo, 2004).
 - **National level: the average payment for irrigation water services** (surface and underground water) in Spain as estimated by the Spanish Ministry of the Environment (2007b) is about 0.05 €/m³
 - **'Medium' price** of 0.04 €/m³ that would cover the financial costs of water supply. (theoretical from Gómez-Limón and Riesgo, 2004).
 - **'Full Cost Recovery (FCR)' price** of 0.06 €/m³ which would be a tough application of full-cost-recovery principle, including a provision for environmental costs. (from Gómez-Limón and Riesgo, 2004).

Identification of the total revenue from sales of the resource

Total revenue = water price to farmers (€/m³) * yearly water consumption (m³) for irrigation

Local level: the Pisuerga Channel area

Water consumption: about 70 Mm³/year (based on data from Gómez-Limón and Riesgo, 2004).

$$0.01 \text{ €/m}^3 * 70 \text{ Mm}^3/\text{year} = 0.7 \text{ M€}/\text{year}$$

National level: order of magnitude in Spain

Water consumption: about 16,500 Mm³/year (Ministry of Environment, 2007)

$$0.05 \text{ €/m}^3 * 16,500 \text{ Mm}^3/\text{year} = 8,250 \text{ M€}/\text{year}$$

Determining the subsidy value by subtracting total revenue from total MVP

If no elasticity is considered – i.e. assuming the water consumed remains on average the same, disregarding the change in water pricing, the subsidy can be calculated as follow:

Subsidy = (water value – water price to farmers) * yearly water consumption (m³) for irrigation

Local level: the Pisuerga Channel area

Assuming medium price: $(0.04 \text{ €/m}^3 - 0.01 \text{ €/m}^3) * 70 \text{ Mm}^3/\text{year} = 2.1 \text{ M€}$

Assuming FCR: $(0.06 \text{ €/m}^3 - 0.01 \text{ €/m}^3) * 70 \text{ Mm}^3/\text{year} = 3.5 \text{ M€}$

National level: order of magnitude in Spain

Assuming FCR: $(0.06\text{€/m}^3-0.05\text{€/m}^3) * 16,500 \text{ Mm}^3/\text{year} = 165 \text{ M€}/\text{year}$

Sources

Gómez-Limón, J.A. and Riesgo, L. 2004. *Irrigation water pricing: differential impacts on irrigated farms*. Agricultural Economics 31 (2004) 47–66

Ministerio de Medio Ambiente (Ministry of Environment). 2007. *Perfil Ambiental de España 2007. Informe basado en indicadores*.

And own calculations (explained in the text)

Methodological note: Please note that, at local level, calculations are based on data for a small portion of the Spanish territory (the Community of irrigators in the Pisuerga Channel) as estimated by Gómez-Limón and Riesgo (2004).

At national level, it should be noted that the average price of irrigation water in Spain is above the water price in the Pisuerga Channel and also above the financial cost recovery estimated by Gómez-Limón and Riesgo (2004). No estimate was found on the actual financial cost of water for the whole Spain, nor for the full cost recovery price. Hence the FCR price used for the Pisuerga Channel has been used as a lower bound to estimate the level of subsidy in the whole country. This is meant to provide an order of magnitude rather than an exact size of the subsidy, and should be taken as a minimum value.

Value of marginal social costs

This can be calculated using the FCR price (as above)

Local, Assuming FCR: $(0.06 \text{ €/m}^3 - 0.01 \text{ €/m}^3) * 70 \text{ Mm}^3/\text{year} = 3.5 \text{ M€}$

National, Assuming FCR: $(0.06\text{€/m}^3-0.05\text{€/m}^3) * 16,500 \text{ Mm}^3/\text{year} = 165 \text{ M€}/\text{year}$

Total subsidy value (explicit and implicit subsidies) (as above)

Local, Assuming medium price: $(0.04 \text{ €/m}^3 - 0.01 \text{ €/m}^3) * 70 \text{ Mm}^3/\text{year} = 2.1 \text{ M€}$

Local, Assuming FCR: $(0.06 \text{ €/m}^3 - 0.01 \text{ €/m}^3) * 70 \text{ Mm}^3/\text{year} = 3.5 \text{ M€}$

National, Assuming FCR: $(0.06\text{€/m}^3-0.05\text{€/m}^3) * 16,500 \text{ Mm}^3/\text{year} = 165 \text{ M€}/\text{year}$

National, Assuming FCR, per ha: $165 \text{ M€}/\text{year} : 3\text{Mha} = 55 \text{ €/ha}$

Where: irrigated hectares in Spain = 3Mha (Min Env, 2007)

For a more accurate calculations using elasticity see below.

Range estimates of the above where uncertainty exists (e.g. elasticity assumptions)

Gómez-Limón and Riesgo, 2004 also assessed the likely changes in water abstraction in the Community of irrigators in the Pisuerga Channel if the water price were to raise to 0.04 (medium price) and 0.06 €/m³ (FCR price) respectively.

Given the difficulty to translate these results at national level we will calculate the effects of elasticity only in the Pisuerga Channel area:

	Water price (€/m ³)	% change in water consumption (weighted average – see below)	Consumption (2003) (Mm ³)	public revenue (M€) (water price * consumption)	Subsidy (M€) (new public revenues - revenues at current price)
Current price	0.01	-	70	0.7	
Medium price	0.04	50.90%	34	1.4	0.7
FCR price	0.06	62.30%	26	1.6	0.9

Where subsidy is equal to:

$$\text{Current price} * \text{current consumption} - (\text{new water price} * \text{new level of water consumption})$$

i.e. Revenues from new water price – revenues from current water price

Using the ‘medium’ price as a reference value for the unsubsidised price of water, the amount of the subsidy is about 0.7 M€/year in the Pisuerga Channel area

If externalities are taken into account (‘FCR’ price) the subsidy is about 0.9 €/m³

The percentage change in water consumption was calculated as a weighted average of the changes for 3 cluster groups of farmers (see case study task 2 for details on the 3 clusters). Different weights are based on the percentage of land farmed by each cluster in the Community of irrigators in the Pisuerga Channel. The weighted average was calculated as follow:

Cluster	Weight (%) based on % area covered	% change in consumption	
		At 0.04 €/m ³	At 0.06 €/m ³
cluster 1	34.5	23.4	43.2
cluster 2	51.9	70	74
cluster 3	13.7	47.8	66.2
Weighted average		50.9	62.3

$$\text{Weighted average at price}_i = \sum \text{change in consumption}_{\text{cluster } x} * \text{weight}_{\text{cluster } x} / \sum \text{weight}_{\text{cluster } x}$$

3.1.2 Percentage-value indicators

1. (Estimated) total subsidy for Spain as a percentage of current costs for irrigation water distribution: 12.8%

Where:

- Subsidy calculated as above point 4 for 'FCR' at national level: 16,500 Mm³/year = 165 M€/year
- Current costs for irrigation water distribution = 1,285 M€/year (Min Env, 2007)

2. (Estimated) total subsidy for Spain as a percentage of 2001 net margin from irrigated agriculture (excl subsidies) (M€1881/ha, according to Min Env, 2007): 2.9%

Where:

- Subsidy calculated as above point 4 for 'FCR' at national level: 16,500 Mm³/year = 165 M€/year
- Net margin from irrigated agriculture (excluding subsidies) = 1,881 M€/ha (Min Env, 2007)

1 TABLE 1: SUMMARY OF RESULTS OF THE APPLICATION OF LEVEL INDICATORS TO THE CASE STUDIES

Subsidy case	Issues	Value Indicators	Percentage Indicators	Narrative text
<p>1. Fuel-tax differentiation (petrol versus diesel excise taxes; UK-low, Austria-med, Netherlands-high) Type of subsidy: Off-budget, tax exemptions and rebates Methodology: Programme aggregation (revenue foregone and revenue gain methods)</p>	<p>An equivalent tax base is difficult to define (diesel and petrol have differing external effects and different energy content per litre; since UK is defined as “no subsidy” because tax levels are the same per litre, this definition will be used.</p> <p>The net loss of public revenue may be somewhat lower than the calculated amounts if one takes into account the reduced need for social assistance to households in ‘fuel poverty’ (defined in the UK as households that need to spend more than 10% of their household income on all domestic fuel use including appliances to heat their home to an adequate level of warmth).</p>	<p><u>Annual value of foregone taxes</u> Austria = € 688,235,294 Netherlands = € 2,111,287,820 UK= € 0</p> <p><u>Revenue gain method:</u> Austria = € 645.854.489 and € 670.576.625 (longer term) The Netherlands = € 1.767.529.561 (short-term) and € 1.968.055.212 (longer-term)</p> <p><u>Marginal social costs:</u></p> <ul style="list-style-type: none"> - <i>Climate-change costs via MSC method (short term):</i> an additional € 3.3 million to € 21.4 million for Austria; an additional € 9.3 million to 60 million for the Netherlands - <i>Climate-change costs via MSC method (longer term):</i> an additional €8.0 million to 51.2 million for Austria; an additional € 22.3 million to 144 million for the Netherlands 	<p><u>Subsidy as average % of total annual fuel cost</u> Austria = 9.8 - 11% Netherlands = 23 – 29%</p> <p><u>Total subsidy as % of total fuel-tax collections</u> Austria = 25.3 – 27% Netherlands = 56.5 – 67%</p>	<p>Assessing the level of subsidization—diesel excise tax subsidies in Austria The total value of annual tax-expenditure subsidies to drivers of diesel vehicles in Austria is estimated to be between 691 and 739 € million, including the costs of climate change. Of this, € 688 million is due to foregone tax revenue and € 3 to 51 million is due to climate-change costs associated with subsidy-induced driving behaviour. Removing the diesel excise-tax subsidy would on average increase the cost of driving a diesel vehicle in Austria by 10% and increase fuel-tax revenue by 27%.</p> <p>Assessing the level of subsidization—diesel excise tax subsidies in the Netherlands The total value of annual tax-expenditure subsidies to drivers of diesel vehicles in Austria is estimated to be between € 2.1 and 2.25 billion, including the costs of climate change. Of this, € 2.1 billion is due to foregone tax revenue and € 9 to 143 million is due to climate-change costs associated with subsidy-induced driving behaviour. Removing the diesel excise-tax subsidy would on average increase the cost of driving a diesel vehicle in the Netherlands by 27% and increase fuel-tax revenue by 67 %.</p> <p>Assessing the level of subsidization—diesel excise tax subsidies in the UK The United Kingdom taxes petrol and diesel at the same rate per litre (66 €cents), which means that relative to petrol, diesel is not subsidised.</p>

1 TABLE 1: SUMMARY OF RESULTS OF THE APPLICATION OF LEVEL INDICATORS TO THE CASE STUDIES

Subsidy case	Issues	Value Indicators	Percentage Indicators	Narrative text
<p>2. Preferential tax treatment for company cars in the Netherlands <u>Type of subsidy:</u> Off-budget, tax exemptions and rebates <u>Methodology:</u> Programme aggregation (revenue foregone)</p>		<p><u>Range:</u> Higher figures are for higher income tax bracket and lower figures are for lower income tax bracket. The total revenue tax foregone due to the lower taxation is between 2.2 € billion (for lower income tax rate) and 2.6 € billion (for higher income) (in 2008). For marginal social cost, see narrative text column.</p>	<p><u>Subsidy as average % of total annual cost of car ownership</u> For ‘standard’ cars, the value of taxes foregone is between 21.48% (1,869€) and 26.59% (2,314€) of total net annual cost of ownership due to the level of taxation of company cars as a fringe benefit. For ‘cleaner’ cars, the revenue foregone is higher.</p> <p><u>Subsidy as % of relevant tax collections on cars.</u> Considering the income tax advantage, the non payment of VAT for purchase and repairs, results in a total value of tax foregone between 2,530€ (29% of annual cost of owning a car) and 3,191€ (37% of annual cost of owning a car).</p>	<p><u>The implicit price subsidy is:</u> - The implicit price subsidy given to employees is equal to 4,450€ annually for company cars above 140gCO2/km, 5,300€ for ‘clean’ cars and 6,320€ for ‘very clean’ cars. - The annual net costs of owning a car is about double that of what the employee pays for under the current taxation scheme (for (very) clean cars employees get a greater discount). - The non-distortionary percentage of car value that should be considered as taxable income is 51% (8,700/17,000), much higher than 25%. <u>The taxes foregone for the income tax advantage:</u> The total revenue tax foregone due to the lower taxation is between 2.2 billion € and 2.6 billion € (in 2008). The marginal social cost: a) The marginal social costs due to the additional driving is between €139,345,324 (in interurban areas) and €384,509,276 (in urban areas) (in 2008). b) Assuming that without the subsidy 37% of the current company car fleet would switch from diesel to petrol, this would mean 323,044 cars. If each of these cars drives 15,000 km per year with 1.5 passengers, the total travel involved would amount to 7,268,482,575 passengerkm, implying that external costs of €73 million would be avoided in the counterfactual case. c) There are more cars around than there would otherwise be. The main external costs of increased car ownership are those of additional distance driven. Presumably, these are already covered by the figures under point a) above.</p>

1 TABLE 1: SUMMARY OF RESULTS OF THE APPLICATION OF LEVEL INDICATORS TO THE CASE STUDIES

Subsidy case	Issues	Value Indicators	Percentage Indicators	Narrative text
<p>3. Nuclear energy (Germany; tax-deductions for decommissioning funds) <i>As stated in the selection criteria fiche in Annex 1, it was not deemed feasible to carry out a comprehensive assessment of nuclear subsidies in Germany in the project duration.</i></p>				
<p>4. Reduced VAT for domestic energy use (UK) <u>Type of subsidy:</u> Off-budget, tax exemptions and rebates <u>Methodology:</u> Programme aggregation (revenue foregone and revenue gain methods)</p>	<p>The net loss of public revenue may be somewhat lower than the calculated amounts if one takes into account the reduced need for social assistance to households in ‘fuel poverty’ (defined in the UK as households that need to spend more than 10% of their household income on all domestic fuel use including appliances to heat their home to an adequate level of warmth)</p>	<p><u>Annual value of foregone taxes:</u> Revenue foregone method = € 3.9 billion Revenue gain method = € 3.8 billion <u>Marginal social cost:</u> = € 144 million <u>Total sum:</u> With revenue foregone method: € 4.0 billion With revenue gain method: = € 3.9 billion</p>	<p>Subsidy as average % of total annual energy cost = 11.9 % Total subsidy as % of total VAT collections on energy = 3 %</p>	<p>Annual implicit subsidies by reduced VAT for domestic energy users can be estimated at a total EUR 3.9 to 4.0 billion. Of this, EUR 3.8 to 3.9 billion is due to foregone tax revenue and EUR 144 million is due to externalities associated with external costs due to subsidy-induced energy consumption. Removing the subsidy would on average increase the cost of residential energy consumption in the UK by almost 12%.</p>
<p>5. Biofuels (Germany) <u>Type of subsidy:</u> Off-budget, tax exemptions and rebates <u>Methodology:</u> Programme aggregation (revenue foregone and revenue gain methods)</p>	<p>There are no readily available estimates or valuation tools for the external costs of biofuels. These costs largely depend on assumptions regarding the type of feedstocks used, the cultivation technique employed, production and distribution processes, and the type of engine in which biofuels are used. – See range estimate in next column.</p>	<p><u>Annual value of foregone taxes in 2004:</u> Biodiesel = € 559,776,000 Bioethanol = € 53,917,710 Sum = € 613,693,710</p>	<p><u>Subsidy as an average % of the price per litre of fuel</u> Biodiesel = €0.4704/€0.76 = 62% Bioethanol=€0.6545/€0.55=119% <u>Subsidy as % of total fuel tax collections in 2004</u> = 1.47 %</p>	<p>Annual subsidies to biofuels in 2004 were € 0.61 billion due to foregone tax revenue. Removing the subsidy would on average increase the price of biodiesel in Germany by 62% and the price of bioethanol in Germany by 119%, and increase tax revenue by 1.47%.</p>

1 TABLE 1: SUMMARY OF RESULTS OF THE APPLICATION OF LEVEL INDICATORS TO THE CASE STUDIES

Subsidy case	Issues	Value Indicators	Percentage Indicators	Narrative text
<p>6. Subsidies to irrigation (Spain) Type of subsidy: Off-budget, price paid for water below full economic rent Methodology: Resource rent</p>	<p><i>Wide differences in prices across region exist, depending on local conditions. Data exist for some specific areas, but broad assumptions need to be made to assess the level of subsidies at national level. It is also difficult to assess what the cost of externalities is (here it was based on assumptions found in the literature)</i></p>	<p><i>In the Pisuerga Channel – using the medium price(0.04€/m3) and the FCR price(0.06 €/m3) as proxies of the ‘true’ price of water</i></p> <p><i>Medium price: M€ 2.1 /year FCR price= M€ 3.5 /year</i></p> <p><i>In the whole Spain - using the FCR price (0.06€/m3) as a proxy of the ‘true’ price of water,</i></p> <p><i>total size of subsidy = M€ 165 /year</i></p> <p><i>(estimated) total subsidy for Spain over irrigated hectares (3Mha, according to Min Env, 2007): 55 €/ha</i></p>	<p><i>(estimated) total subsidy for Spain as a percentage of current costs for irrigation water distribution (M€1,285, according to Min Env, 2007): 12.8%</i></p> <p><i>(estimated) total subsidy for Spain as a percentage of 2001 net margin from irrigated agriculture (excl subsidies) (M€1881/ha, according to Min Env, 2007): 2.9%</i></p>	<p>The size of water subsidy for irrigation in the Pisuerga Channel ranges between 2.1 M€/year (if we use, as a benchmark, a ‘real’ price of water of 0.04€/m3 based on financial cost recovery) and M€3.5/year (considering Full Cost Recovery (FCR) price of 0.06€/ha).</p> <p>Considering an average water price of 0.05€/ha for the whole Spain, and comparing it to the FCR price of 0.06€/ha, the overall size of subsidies in Spain can be estimated to be about 165 M€/year.</p>