

Annex 3: Case studies in the transport sector

‘Environmentally Harmful Subsidies: Identification and Assessment’

A study led by IEEP, with Ecologic, IVM and Claudia Dias Soares for the European Commission, DG Environment

Task 2: Testing the OECD tools on case studies

1	FUEL TAX DIFFERENTIATION DIESEL VS PETROL	2
1.1	Testing the QUICK SCAN MODEL	2
1.1.1	Linkage 1 - the impact of the support on the volume and composition of output in the economy	2
1.1.2	Linkage 2 – The mitigating effect of environmental policies in place	7
1.1.3	Linkage 3 - the assimilative capacity of the affected environment	10
1.2	Testing the CHECKLIST	12
1.2.1	Step 1 – Does the policy filter effectively limits environmental damage .	12
1.2.2	Step 2 - More benign alternatives are available now or emerging	13
1.2.3	Step 3 - Does subsidy conditionality lead to higher production.....	14
1.3	Testing the INTEGRATED ASSESSMENT FRAMEWORK	16
1.3.1	Features Scan	16
1.3.2	Incidental Impacts.....	18
1.3.3	Long-Term Effectiveness	19
1.3.4	Policy Reform.....	19
2	COMPANY CAR TAXATION IN THE NETHERLANDS.....	21
2.1	Testing the QUICK SCAN MODEL	21
2.1.1	Linkage 1 - the impact of the support on the volume and composition of output in the economy	21
2.1.2	Linkage 2 – The mitigating effect of environmental policies in place	24
2.1.3	Linkage 3 - the assimilative capacity of the affected environment	25
2.2	Testing the CHECKLIST.....	28
2.2.1	Step 1 – Does the policy filter effectively limits environmental damage?	28
2.2.2	Step 2 - More benign alternatives are available now or emerging	28
2.2.3	Step 3 - Does subsidy conditionality lead to higher production?	30
2.3	Testing the INTEGRATED ASSESSMENT FRAMEWORK	31
2.3.1	Features Scan	31
2.3.2	Incidental Impacts.....	33
2.3.3	Long-Term Effectiveness	34
2.3.4	Policy Reform.....	35

1 FUEL TAX DIFFERENTIATION DIESEL VS PETROL

1.1 Testing the QUICK SCAN MODEL

1.1.1 *Linkage 1 - the impact of the support on the volume and composition of output in the economy*

1.	Linkage 1 - <i>the impact of the support on the volume and composition of output in the economy.</i> This identifies the link between the type of subsidy, its point of impact (input, output, profit or income), the price elasticity of demand and supply associated with the activity subsidised and ultimately the impacts on the levels of production and consumption. This in turn is what creates pressure on the environment. The following points are required to describe the linkage.
1.1. <i>Describe the type of subsidy</i>	The average excise duty on petrol and diesel is a support conditional on the purchase of a product. The two different goods receive different levels of taxation in many Member States, thus favouring one product over the other. Tax levels for diesel are frequently differentiated based on whether the fuel is for commercial or non-commercial use. Petrol is not considered a commercial transport fuel. In this case, we examine diesel subsidies in Austria, the Netherlands and the UK, focusing on non-commercial diesel taxes in comparison to petrol taxes. We also examine commercial diesel issues in the subsidy framework, though the case for this being a subsidy is less clear cut (i.e. whereas the non-commercial tax has a clear baseline in the petrol tax rate, the commercial excise tax has a more tenuous connection to a “non-subsidised” baseline. Still, we include the commercial issue as it has interesting properties that reveal the abilities of the OECD tools to guide analysts in examine the objectives, incidence, economic properties and other effects of an input subsidy to producers.)
1.2. <i>What is the point of impact (conditionality) of the subsidy</i>	For private users, final demand for motor fuel is the point of impact for fuel subsidies. Depending on the fuel type, fuels receive lower rates of taxation, which affects the amount of sales and stimulates demand. Its effect on production and input volumes depend on the relevant price elasticities. In this case, if diesel were to be taxed at the same rate as petrol, the demand for diesel would decrease. Where motor fuel is an input to commercial use, the subsidy has effects on the input costs, with secondary effects on income and profits.
1.3. <i>What are the intended recipients of the subsidy</i>	The main reason for lower tax rates on diesel is the historical use of diesel for business use (in haulage). A secondary and less important historical reason is energy efficiency stemming from diesel's higher per-volume energy content and the relative efficiency of diesel engines. From a lifecycle perspective, CO ₂ emissions <i>per litre</i> are higher for diesel, while CO ₂ emissions <i>per kilometre</i> are higher for petrol. The intended recipients of the subsidy for transportation uses are finished-product consumers (households) and finished-input consumers (e.g. haulage firms). In addition to consumers, some of the support for diesel leaks away and also benefits the non-target sector. Since the government support is based on the use of a particular input (diesel), it reduces the user costs of the input in the production or consumption process. ¹ For commercial diesel use, downstream effects exist (e.g. the price of goods includes the fuel costs associated with transport). In addition, average excise duties have significant upstream effects on fuel producers and trade and also support the development of a specific diesel technology in Europe.

¹ OECD 1998 (p. 43).

<p>1.4. <i>Size of the subsidy</i></p>	<p>The table below shows excise duty rates for the non-commercial, non-agricultural use of petrol and diesel in the three case countries (Austria, The Netherlands and the UK).</p> <p>Table 1. Average excise duties in the case countries (Austria, the Netherland and the UK)</p> <table border="1" data-bbox="395 369 1428 806"> <thead> <tr> <th rowspan="2">Country</th> <th colspan="2">Average Excise Duty (EUR) per 1,000 Litres</th> <th colspan="2">Difference</th> <th rowspan="2">Candidate for Selection</th> <th rowspan="2">Notes</th> </tr> <tr> <th>Petrol</th> <th>Diesel</th> <th>Difference (Petrol minus Diesel)</th> <th>% Difference (Petrol over Diesel)</th> </tr> </thead> <tbody> <tr> <td colspan="7">Recommended cases</td> </tr> <tr> <td>UK</td> <td>661</td> <td>661</td> <td>0</td> <td>0%</td> <td>Low</td> <td>No subsidy</td> </tr> <tr> <td>Austria (AT)</td> <td>459</td> <td>361</td> <td>98</td> <td>27%</td> <td>Medium</td> <td>Same as aver</td> </tr> <tr> <td>Netherlands (NL)</td> <td>701</td> <td>418</td> <td>282</td> <td>67%</td> <td>High</td> <td></td> </tr> </tbody> </table> <p>For reference, excise taxes on commercial diesel are as follows: AT: no excise tax (i.e. a complete refund of excise tax for commercial and agricultural use of diesel); NL: 77.86 EUR per 1,000 litres plus an energy tax of 170.43 per 1,000 litres; UK: 127.16 EUR per 1,000 litres.</p> <p>Source: DG TAXUD. 2009. Excise Duty Tables, See pp. 8-17 for excise taxes on unleaded petrol and diesel (i.e. gas oil), at http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_II_energy_products-en.pdf</p>	Country	Average Excise Duty (EUR) per 1,000 Litres		Difference		Candidate for Selection	Notes	Petrol	Diesel	Difference (Petrol minus Diesel)	% Difference (Petrol over Diesel)	Recommended cases							UK	661	661	0	0%	Low	No subsidy	Austria (AT)	459	361	98	27%	Medium	Same as aver	Netherlands (NL)	701	418	282	67%	High	
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<p>1.5. <i>Description of the sector, demand and supply conditions of the subsidised industry.</i></p>	<p>The tax differentiation between diesel and petrol subsidises transport activity by households and firms. There are significant indirect effects in related industries (e.g. type of vehicles purchased; transport-intensity of goods and services). Average excise duty is higher for petrol than for diesel in every EU Member State except for the United Kingdom, in which petrol and diesel are taxed at the same per-litre rate.² As a result, it is cheaper for individual consumers of fuel to use diesel rather than petrol in most of the EU. As diesel is by far the primary fuel used in the trucking sector, diesel prices affect the prices of goods that are transported by trucks and affect modal choice at the margin (e.g. truck versus rail). Diesel subsidies benefit the producers of the fuel (upstream effect) because they sell more. Greater demand also increases investment in fossil fuels (upstream effect). This in turn affects trade, for instance, the EU as a whole has a deficit of close to 30 million tonnes per year of diesel that is largely met by imports from Russia³ and has to export overproduction of petrol which is essentially dependent on the demand in the US market.</p> <p>Another trade issue is “fuel tourism” where drivers in high-tax countries cross the border to lower-tax countries to fuel their vehicles. This effect, which relates to differences in Member States’ excise taxes for like fuels (e.g. diesel excise taxes in two neighbouring countries) would be increased in countries that eliminate their diesel subsidy. This issue should also be seen in the wider EU context of an effort to gradually phase out the petrol/diesel differentiation.</p> <p>Other taxes and charges—namely registration and circulation taxes—are sometimes related to the type of fuel used (either differing tax bases for the two fuels or based on CO₂ emissions per kilometre). A detailed analysis of the effects of these differences on vehicle purchasing and use is outside the scope of this case study, but the following table describes the relevant taxes.</p>																																							

² DG TAXUD. 2009. Excise Duty Tables, See pp. 8-17 for excise taxes on unleaded petrol and diesel (i.e. gas oil), at

CO₂/Fuel-consumption taxes, by country, 2009	
COUNTRY	CO₂/FUEL CONSUMPTION TAXES
AUSTRIA	<p>A fuel consumption tax (Normverbrauchsabsage or NoVA) is levied upon the first registration of a passenger car. It is calculated as follows:</p> <ul style="list-style-type: none"> - Petrol cars: 2% of the purchase price x (fuel consumption in litres – 3 litres) - Diesel cars: 2% of the purchase price x (fuel consumption in litres – 2 litres) <p>Under a bonus-malus system, cars emitting less than 120g/km receive a maximum bonus of € 300. Cars emitting more than 180g/km pay a penalty of € 25 for each gram emitted in excess of 180g/km. (160 g/km as from 1 January 2010). Alternative fuel vehicles attract a bonus of maximum € 500. In addition, diesel cars emitting more than 5 mg of particulate matter per km pay a penalty of maximum € 300. Conversely, diesel cars emitting less than 5 mg of particulate matter per km and less than 80 g of NO_x per km attract a bonus of maximum € 200. The same applies to petrol cars emitting less than 60 g of No_x per km.</p>
THE NETHERLANDS	<ol style="list-style-type: none"> 1. The rate of the registration tax (based on price) is reduced or increased in accordance with the car's fuel efficiency relative to that of other cars of the same size (length x width). The maximum bonus is € 1,400 for cars emitting more than 20% less than the average car of their size (A label), the maximum penalty is € 1,600 for cars emitting more than 30% more than the average car of their size (G label). Hybrid cars benefit from a maximum bonus of € 6,400. Cars emitting maximum 95 g/km (diesel) and 110 g/km (other fuels) respectively are completely exempted from this registration tax. Cars emitting more than 205 g/km (petrol) and 170 g/km (diesel) respectively pay an additional tax supplement of € 125 per gram emitted in excess of these thresholds. 2. Cars with CO₂ emissions of up to 110 g/km (petrol) and 95 g/km (diesel) respectively pay a lower annual circulation tax.
UNITED KINGDOM	<ol style="list-style-type: none"> 1. The annual circulation tax is based on CO₂ emissions. Rates range from £ 0 (up to 100 g/km) to £ 400 (petrol, diesel)/ £385 (alternative fuels) for cars emitting more than 255 g/km. 2. Company car tax rates range from 10% of the car price for cars emitting up to 120 g/km to 35% for cars emitting 235 g/km or more. Diesel cars pay a 3% surcharge, up to the 35% top rate.
<p>Source: ACEA. 2009. OVERVIEW OF CO₂ BASED MOTOR VEHICLE TAXES IN THE EU. April. http://www.acea.be/images/uploads/files/20090428_CO2_taxation_overview.pdf</p>	

http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_II_energy_products-en.pdf

³ “Petrol and diesel price differential.” (December 2008.)
 UKpia. http://www.ukpia.com/industry_issues/marketing/influences_on_petrol_diesel_prices.aspx.

It should be noted that many factors contribute to the relative sales figures of diesel versus petrol vehicles. As shown in the following table, for the three case countries (AT, NL, UK), it is the country with the highest level of relative subsidy that has the lowest share of diesel sales (NL, where diesel taxes are 67% lower than petrol taxes). The precise effect of removing a diesel subsidy would be mitigated by other factors.

Share of diesel vehicles in new passenger-car sales, by case country and year

	2000	2004	2007
AT	62%	71%	59%
NL	23%	25%	28%
UK	15%	32%	40%

Source: DG Environment, personal communication, 9 July 2009.

A detailed analysis of the causes for differences among these and other EU countries is beyond the scope of this study. An analysis of 2002 diesel market share and contributing fiscal factors found that “In Belgium, France, Germany, Italy, and Spain low diesel fuel prices relative to gasoline prices appear to be encouraging diesel sales despite tax policies favoring gasoline vehicles” and that “In Austria, registration taxes are lower for more fuel economical vehicles while ownership taxes are based upon vehicle power (kW), both of which favor diesels. Thus, despite relatively more expensive diesel fuel compared to other European countries, Austria has long been the leader in diesel sales due to its favorable tax policies. Similarly, despite diesel fuel being more expensive than gasoline, diesel sales in the United Kingdom are also higher than expected as a result of a new ownership tax based on CO2 specifically” (Chen and Sperling, 2004, p. 16). The following table shows a summary of the 2004 analysis (despite being out of date, it is used here to illustrate how other fiscal and economic factors contribute to the diesel vs. petrol buying decision):

Table 4.1 COMPARISON OF DIESEL MARKET SHARE IN 2002 TO FISCAL/ECONOMIC FACTORS

	Market Share	Price Ratio	Registration tax favors:	Ownership tax favors:
Austria	69.6 (1)	0.84 (11)	Diesel	Diesel
Belgium	64.3 (2)	0.74 (4)	Gasoline	Gasoline
Denmark	20.1 (11)	0.84 (11)	Gasoline	Neutral
Finland	15.6 (13)	0.73 (2)	Gasoline	Gasoline
France	63.2 (3)	0.76 (5)	NA	NA
Germany	37.9 (7)	0.82 (9)	NA	Gasoline
Greece	0.9 (15)	0.85 (12)	Gasoline	Gasoline
Ireland	16.4 (12)	0.91 (14)	Gasoline	Gasoline
Italy	43.5 (6)	0.82 (9)	Neutral	Diesel
Luxembourg	61.9 (4)	0.82 (9)	NA	Gasoline
Netherlands	21.6 (10)	0.74 (4)	Gasoline	Gasoline
Portugal	34.6 (8)	0.71 (1)	Gasoline	Gasoline
Spain	57.3 (5)	0.80 (6)	Gasoline	Gasoline
Sweden	7.0 (14)	0.90 (13)	NA	Gasoline
United Kingdom	23.5 (9)	1.03 (15)	NA	Diesel

Ranks of Market Share and Price Ratio shown in parentheses.

(Sources: ACEA, IEA Energy Prices and Taxes 1999: 3rd-4th Quarter and 2003: 2nd Quarter, and COWI)

Source: Chen, Belina and Dan Sperling. 2004. Analysis of Auto Industry and Consumer Response to Regulations and Technological Change, and Customization of Consumer Response Models in Support of AR 1493 Rulemaking Case Study of Light-Duty Vehicles in Europe.

http://www.pubs.its.ucdavis.edu/download_pdf.php?id=176

<p>1.6. Price elasticity of demand and supply of the input and output markets</p>	<p>In the short term, demand for diesel and petrol is quite inelastic, becoming more elastic over longer time periods that allow for changes in travel behaviour and vehicle/modal/fuel choice. The downstream effects could include a shift in the modality of travel and transport and logistics patterns. For example, trains and ships might be used more often or more efficient trucking patterns might evolve. There would also be significant upstream effects on trade and production. The cross price elasticity of diesel and petrol is also relevant, with implications for vehicle producers on demand for diesel versus petrol engines.</p> <p>In an extensive review of fuel price elasticity data, Goodwin, Dargay and Hanly (2004) found the following price effects: “Taking what were judged to be the best defined results, the overall picture implied is as follows. (According to the assumption of symmetry, all the statements might be reversed by replacing ‘up’ and ‘down’.) 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:</p> <p>(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. “The reason why fuel consumed falls by more than the volume of traffic is probably because price increases trigger a more efficient use of fuel (by a combination of technical improvements to vehicles, more fuel-conserving driving styles and driving in easier traffic conditions). A further probable differential effect is between high- and low-consumption vehicles, since with high prices, gas guzzlers are more likely to be the vehicles left at home or scrapped. “Therefore, further consequences of the same price increase are as follows: (c) Efficiency of the use of fuel rises by about 1.5% within a year, and around 4% in the longer run. (d) Total number of vehicles owned falls by less than 1% in the short run, and by 2.5% in the longer run.” Source: Goodwin, P., J Dargay and M. Hanly (2004). Elasticities of Road Traffic and Fuel Consumption with Respect to Price and Income: A Review. Transport Reviews, Vol. 24, No. 3, 275–292, May 2004 http://www2.cege.ucl.ac.uk/cts/tsu/papers/transprev243.pdf</p> <p>The importance of cross-price elasticity for motor fuels is underscored in OECD (2006b). The Political Economy of Environmentally Related Taxes. pp. 56-59. http://books.google.com/books?id=KDNoSDqTBWMC. Removing the diesel subsidy would cause a drop in demand for diesel that would be partially offset by users of motor fuel switching to petrol vehicles. No cross-price elasticity estimates are provided.</p>
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1.1.2 Linkage 2 – The mitigating effect of environmental policies in place

<p>2. Linkage 2 – <i>The mitigating effect of environmental policies in place</i> – which takes into consideration policies and emission abatement techniques. Linkage 2 measures the emissions or environmental impacts that result from a volume of activity excluding those ‘filtered’ by environmental policies.</p>	
<p>2.1. Are there any environmental policies in place or emission abatement techniques which mitigate the impacts of the support?</p>	<p>Environmental policies in place include minimum mileage requirements, emissions standards, and requirements regarding emissions-control technologies. There are no abatement techniques for CO₂ emissions from a given quantity of fuel, though incorporating biofuels into the fuel mix would effect CO₂ emissions. Since diesel and petrol have differing external effects and energy content, and because pollution abatement technologies exist for motor vehicles, it is difficult to determine to what extent fuel tax differentiation affects the environment (though CO₂ emissions, being a direct function of fuel consumption, are easier to relate to fuel prices). The following chart developed by the Union of Concerned Scientists compares the environmental effects of petrol and diesel (see the table below).</p>
<p>2.2. What are the impacts of the environmental policies in place?</p> <p>Also, is it possible to describe the impact of environmental policy on environmental expenditures by the industry? If yes, please explain.</p>	<p>There are a series of environmental policies in place to minimize harmful environmental effects from diesel. There are fuel-quality standards, technology requirements, efficiency standards and emission standards. Currently, only diesel fuel with an ultra-low sulphur content (no more than 10 parts per million) can be marketed within the EU.⁴ This is to reduce pollutant emissions primarily of dust particles or particulate matter. This regulation will also facilitate the new technology requirements, such as particle filters on diesel vehicles. In addition, efficiency and emission standards are one way to limit demand for diesel and thus minimise the detrimental environmental effects. In December 2008, EU lawmakers approved CO₂ standards to gradually limit CO₂ emissions to 120 g/km for 65% of new cars in 2012, 75% in 2013, 80% in 2014 and 100% in 2015.⁵ Efficiency standards are the only environmental measure that specifically targets CO₂ emissions. There are emission standards for other types of gases, as shown below. The standards for CO are more stringent for diesel, but diesel is allowed a higher amount of NO_x in comparison to petrol cars.</p> <p>See table below for emissions standards.</p>

Comparison – Diesel vs. Gasoline			
CATEGORY	DIESEL	GASOLINE	NOTES
Initial cost	–	ok	
Range	+	ok	
Extreme towing capability	+	ok	
Infrastructure availability	–	++	
Tested tailpipe pollution	–	+	
In-use pollution	--	–	a
Maximum potential oil reduction	+	+	
Maximum potential global warming benefits	++	+	b

⁴ “EU Government proposes low carbon transport fuel standard” (January 2007) *Environment News Service*. <http://www.ens-newswire.com/ens/jan2007/2007-01-31-05.asp>

⁵ “EU clinches deal on CO₂ emissions from cars.” (December 2008). *EurActiv.com*. <http://www.euractiv.com/en/transport/eu-clinches-deal-co2-emissions-cars/article-177675>

Cost-effectiveness for oil reduction	+	++				
Cost-effectiveness for global warming benefits	+	++				
Net consumer savings	+	++	c			
Source: Reproduced from Monahan, Patricia and David Friedman. 2004. The Diesel Dilemma: Diesel's Role in the Race for Clean Cars. <i>Union of Concerned Scientist, p. 1</i>						
http://www.ucsusa.org/clean_vehicles/technologies_and_fuels/gasoline_and_diesel/the-diesel-dilemma-diesels.html						
Key:						
Excels in this area		++				
Does well in this area		+				
Performs adequately in this area		ok				
Does less well in this area		-				
Performs poorly in this area		--				
Notes:						
a. Assumes diesel emission controls fail at the same rate as those for gasoline vehicles, resulting in higher in-use pollution.						
b. If diesel soot proves to be an important heat-trapping gas and is difficult to control, the potential global warming benefits from diesel will be muted.						
c. It should be noted that different gasoline and diesel formulations can affect cost, oil demand, and greenhouse gas emissions. Nevertheless, our general finding that gasoline is more cost-effective than diesel appears to hold true among common gasoline and diesel formulations.						
EU Emission Standards for Passenger Cars (Category M₁*), g/km						
Tier	Date	CO	HC	HC+NO _x	NO _x	PM
Diesel						
Euro 1†	1992.07	2.72 (3.16)	-	0.97 (1.13)	-	0.14 (0.18)
Euro 2, IDI	1996.01	1.0	-	0.7	-	0.08
Euro 2, DI	1996.01 ^a	1.0	-	0.9	-	0.10
Euro 3	2000.01	0.64	-	0.56	0.50	0.05
Euro 4	2005.01	0.50	-	0.30	0.25	0.025
Euro 5	2009.09 ^b	0.50	-	0.23	0.18	0.005 ^c
Euro 6	2014.09	0.50	-	0.17	0.08	0.005 ^c
Petrol (Gasoline)						
Euro 1†	1992.07	2.72 (3.16)	-	0.97 (1.13)	-	-
Euro 2	1996.01	02. Feb	-	0.5	-	-
Euro 3	2000.01	Feb 30	0.20	-	0.15	-
Euro 4	2005.01	1.0	0.10	-	0.08	-
Euro 5	2009.09 ^b	1.0	0.10 ^c	-	0.06	0.005 ^{d,e}
Euro 6	2014.09	1.0	0.10 ^c	-	0.06	0.005 ^{d,e}
* At the Euro 1..4 stages, passenger vehicles > 2,500 kg were type approved as Category N ₁ vehicles						
† Values in brackets are conformity of production (COP) limits						
a - until 1999.09.30 (after that date DI engines must meet the IDI limits)						

b - 2011.01 for all models
c - and NMHC = 0.068 g/km
d - applicable only to vehicles using DI engines
e - proposed to be changed to 0.003 g/km using the PMP measurement procedure
Source: Reproduced from EU Emission Standards for Cars and Light Trucks. 2007. http://www.dieselnet.com/standards/eu/ld.php

EU Emission Standards for Light Commercial Vehicles, g/km							
Category†	Tier	Date	CO	HC	HC+NO _x	NO _x	PM
Diesel							
N₁, Class I ≤1305 kg	Euro 1	1994.10	Feb 72	-	0.97	-	0.14
	Euro 2, IDI	1998.01	1.0	-	0.70	-	0.08
	Euro 2, DI	1998.01 ^a	1.0	-	0.90	-	0.10
	Euro 3	2000.01	0.64	-	0.56	0.50	0.05
	Euro 4	2005.01	0.50	-	0.30	0.25	0.025
	Euro 5	2009.09 ^b	0.50	-	0.23	0.18	0.005 ^c
	Euro 6	2014.09	0.50	-	0.17	0.08	0.005 ^c
N₁, Class II 1305-1760 kg	Euro 1	1994.10	Mai 17	-	Jan 40	-	0.19
	Euro 2, IDI	1998.01	Jan 25	-	1.0	-	0.12
	Euro 2, DI	1998.01 ^a	Jan 25	-	Jan 30	-	0.14
	Euro 3	2001.01	0.80	-	0.72	0.65	0.07
	Euro 4	2006.01	0.63	-	0.39	0.33	0.04
	Euro 5	2010.09 ^c	0.63	-	0.295	0.235	0.005 ^c
	Euro 6	2015.09	0.63	-	0.195	0.105	0.005 ^c
N₁, Class III >1760 kg	Euro 1	1994.10	Jun 90	-	Jan 70	-	0.25
	Euro 2, IDI	1998.01	01. Mai	-	Jan 20	-	0.17
	Euro 2, DI	1998.01 ^a	01. Mai	-	Jan 60	-	0.20
	Euro 3	2001.01	0.95	-	0.86	0.78	0.10
	Euro 4	2006.01	0.74	-	0.46	0.39	0.06
	Euro 5	2010.09 ^c	0.74	-	0.350	0.280	0.005 ^c
	Euro 6	2015.09	0.74	-	0.215	0.125	0.005 ^c
Petrol (Gasoline)							
N₁, Class I ≤1305 kg	Euro 1	1994.10	Feb 72	-	0.97	-	-
	Euro 2	1998.01	02. Feb	-	0.50	-	-
	Euro 3	2000.01	02. Mrz	0.20	-	0.15	-
	Euro 4	2005.01	1.0	0.1	-	0.08	-
	Euro 5	2009.09 ^b	1.0	0.10 ^f	-	0.06	0.005 ^{d,e}
	Euro 6	2014.09	1.0	0.10 ^f	-	0.06	0.005 ^{d,e}
	N₁, Class II 1305-1760 kg	Euro 1	1994.10	Mai 17	-	Jan 40	-
Euro 2		1998.01	4.0	-	0.65	-	-
Euro 3		2001.01	Apr 17	0.25	-	0.18	-
Euro 4		2006.01	Jan 81	0.13	-	0.10	-
Euro 5		2010.09 ^c	Jan 81	0.13 ^g	-	0.075	0.005 ^{d,e}
Euro 6		2015.09	Jan 81	0.13 ^g	-	0.075	0.005 ^{d,e}
N₁, Class III >1760 kg		Euro 1	1994.10	Jun 90	-	Jan 70	-
	Euro 2	1998.01	5.0	-	0.80	-	-
	Euro 3	2001.01	Mai 22	0.29	-	0.21	-
	Euro 4	2006.01	Feb 27	0.16	-	0.11	-
	Euro 5	2010.09 ^c	Feb 27	0.16 ^h	-	0.082	0.005 ^{d,e}
	Euro 6	2015.09	Feb 27	0.16 ^h	-	0.082	0.005 ^{d,e}

† For Euro 1/2 the Category N₁ reference mass classes were Class I ≤ 1250 kg, Class II 1250-1700 kg, Class III > 1700 kg.

a - until 1999.09.30 (after that date DI engines must meet the IDI limits)

b - 2011.01 for all models

c - 2012.01 for all models

d - applicable only to vehicles using DI engines

e - proposed to be changed to 0.003 g/km using the PMP measurement procedure

f - and NMHC = 0.068 g/km
 g - and NMHC = 0.090 g/km
 h - and NMHC = 0.108 g/km

Source: Reproduced from EU Emission Standards for Cars and Light Trucks. 2007.
<http://www.dieselnet.com/standards/eu/ld.php>

1.1.3 Linkage 3 - the assimilative capacity of the affected environment

3. Linkage 3 - the assimilative capacity of the affected environment – which represents the dose response relationship taking into account the assimilative capacity of the environment. This might be a highly site specific factor, particularly when the emissions have predominantly local or regional effects, therefore evaluated through dedicated studies. However, in the case of pollutants that have global effects (like CO ₂ emissions or CFCs) effects are not site specific and general conclusions can be drawn.	
3.1. First, could you describe what the size of the environmental damage is?	<p>It is unclear how best to measure the comparative environmental effects of diesel and petrol. The following excerpts from a study by the Union for Concerned Scientists explains why (see table below).</p> <p>This study by UCS concluded that although diesel is becoming cleaner, key questions and challenges remain and currently petrol vehicles are more cost-effective than diesel for reducing oil use and lowering global warming pollution.⁶ This conclusion is based on a full lifecycle perspective, including the emissions related to fuel refining.</p>
3.2. Could you provide insights on the assimilative capacity of the environment to these impacts?	<p>The assimilative capacity of the environment varies by pollution type. Particulate matter from diesel is a serious concern in urban settings, as are levels of carbon monoxide. Nitrogen oxide is a contributor on a regional level to acid rain as well as greenhouse gases.</p> <p>It is well known that CO₂ emissions are significantly exceeding the environment's assimilative capacity. CO₂ emissions from transport fuel are one of the primary causes of global climate change.</p>

Differences in Environmental Damage from Diesel v. Petrol	
"Each gallon of low-sulfur diesel contains 13.5 percent more energy than a gallon of reformulated gasoline, its higher fuel economy is partly due to its higher energy density, not an inherent gain in efficiency."	
"When both fuel production ("upstream" sources) and vehicle fuel use ("downstream" sources) are taken into account, a gallon of low-sulfur diesel fuel requires more oil than a gallon of reformulated gasoline (Wang, 2003)." ⁷	
"Low-sulfur diesel requires 25 percent more oil per gallon than reformulated gasoline, and 10 percent more oil per gallon of gasoline equivalent."	
"About ten percent of reformulated gasoline is made up of nonpetroleum constituents, such as oxygenates and additives, while low-sulfur diesel is a more pure petroleum product."	
"In general, the higher the fuel economy, the lower the heat-trapping gas emissions for a specific fuel."	
But there are also additional factors which influence the amount of heat-trapping gases:	
	• "The production and refining of each gallon of fuel results in upstream heat-trapping gas

⁶ Monahan, Patricia and David Friedman. 2004. The Diesel Dilemma: Diesel's Role in the Race for Clean Cars. *Union of Concerned Scientists* (p.10).
http://www.ucsusa.org/clean_vehicles/technologies_and_fuels/gasoline_and_diesel/the-diesel-dilemma-diesels.html

⁷ Wang, M. 2003. „The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model.“ Argonne National Laboratory. U.S. Department of Energy. February 24. Online at greet.anl.gov.

emissions. Since reformulated gasoline is a more refined product than low-sulfur diesel, its upstream emissions are slightly higher."
<ul style="list-style-type: none"> • "The carbon content of the fuel directly affects the amount of carbon dioxide released from the tailpipe. Diesel fuel contains more carbon than gasoline, so its tailpipe carbon dioxide emissions are higher." • "Other heat-trapping gases are released during vehicle operation (such as refrigerants in the air conditioning system and black carbon soot released from the tailpipe). There is no consensus on how to account for all the heat-trapping"

Source: Reproduced from Monahan, Patricia and David Friedman. 2004. The Diesel Dilemma: Diesel's Role in the Race for Clean Cars. *Union of Concerned Scientists* (p.10).

Summary of the results of the application of the quick scan to the case study	
1. Is the support likely to have a negative impact on the environment?	Yes, because it increases diesel use and demand. Other fiscal factors (e.g. circulation and registration taxes based on CO2 emissions) are also relevant to the overall picture of how government support related to transport fuels affects the environment.
2. Does the support succeed in transferring income to the intended recipient?	It succeeds in making diesel cheaper for private transport (and in the case of commercial use, for freight and agricultural industries).
3. Is the support worthy of further scrutiny to assess whether their reform/removal would benefit the environment?	Yes. The way the subsidies affect consumer choice, environmental pollution and the transport intensity of products should be understood.
4. What are the impacts on the subsidy on trade? Are they important? How likely it is that if you remove a subsidy in country X, it will have any global environmental impacts?	Due to limited domestic fuel supplies, trade could be significantly impacted. The extent of trade impacts depends on to what extent the subsidy merely shifts demand from petrol to diesel and to what extent it increases overall demand for petroleum imports.

Some additional questions on the use of the quick scan	
<p>The OECD 2005 (p.35) criticises the quick scan method, as not so easy to apply method. In particular, the linkages portrayed by quick scan model can be assessed only through the use of general equilibrium models. The technical and resource constraints of policy makers makes it not always possible to use such models and is 'generally necessary to adopt a more pragmatic and simplified approach.</p>	
1. Based on the application of the tool to your case study, do you think it possible to use the quick scan and produce credible results without employing a general equilibrium model and environmental impact evaluation techniques?	Yes, the quick scan is a very good guide for examining the main issues relating the subsidy to environmental harm. The case study focuses on subsidies to non-commercial diesel (via a lower excise tax rate than petrol). However, we also examined the commercial diesel issue in the subsidy framework as a mean to test the tool. This effort reveals that the Q&A format employs is better suited to examining a single, specific subsidy rather than a complex of related subsidies.

1.2 Testing the CHECKLIST

1.2.1 Step 1 – Does the policy filter effectively limits environmental damage

<p>Is there an environmental policy filter (e.g. size of tradable quota after subsidy removal; level of standards; production limits; rates of environmental taxation; demand and supply elasticities of taxed item etc) which mitigates the effects of a subsidy in the environment? If effective, the removal of the subsidies will bring no or little benefit. Note this section could usefully build on the information collected for analysing linkage 2 in the quick scan.</p>	
<p>1. Describe the environmental policy filter</p>	<p>There are a series of environmental policies in place to minimize harmful environmental effects from diesel. There are fuel-quality standards, technology requirements, efficiency standards and emission standards. Efficiency standards are the only environmental measure that specifically targets CO₂ emissions. There are emission standards for other types of gases, as shown below. The standards for CO are more stringent for diesel, but diesel is allowed a higher amount of NO_x in comparison to petrol cars. Mandating these requirements decreases the environmentally harmful effects from diesel fuel. However, since diesel and petrol have differing external effects and different energy content it is difficult to determine to what extent fuel tax differentiation affects the environment. (Chart on differences between diesel and petrol in quick scan linkage 2, 2.1).</p>
<p>2. What restrictions to production, pollution or resource depletion levels result from the policy filter?</p>	<p>Efficiency standards and CO₂ emission standards reduce overall diesel demand to a certain extent, which in turn reduces resource depletion levels. In December 2008, EU lawmakers approved CO₂ standards to gradually limit CO₂ emissions to 120 g/km for 65% of new cars in 2012, 75% in 2013, 80% in 2014 and 100% in 2015.⁸ Currently, only diesel fuel with an ultra-low sulphur content (no more than 10 parts per million) can be marketed within the EU.⁹ This is to reduce pollutant emissions primarily of dust particles or particulate matter. Requiring particle filters on diesel vehicles also reduces harmful emissions. (Chart on EU emission standards in quick scan linkage 2, 2.2).</p>
<p>3. What will happen to the policy filter once the subsidies are removed? See example on p.90 OECD 2005.</p>	<p>The other policy filters will remain in place. If the diesel subsidy is removed, the price of diesel will increase. As a result, there could be a shift in the mode of travel used to transport goods and a reduction in overall travel by diesel-powered vehicles. Trains might be used more and trucks might make their routes more efficient (change logistical patterns). Biofuels, electric vehicles and other types of environmentally friendly technology would become more competitive. The extent of these changes depends on several factors, including related fiscal policies (e.g. registration and circulation taxes).</p>
<p>4. In the light of the above answers, is the policy filter effective in mitigating the environmental impacts caused by the subsidy?</p>	<p>No, the policy filter does not effectively limit environmental damage to the degree necessary to address climate change. Diesel still emits a significant amount of pollutants into the atmosphere and petrol is currently more cost-effective than diesel for reducing oil use and lowering global warming pollution.¹⁰</p>

⁸ “EU clinches deal on CO₂ emissions from cars.” (December 2008). *EurActiv.com*.

<http://www.euractiv.com/en/transport/eu-clinches-deal-co2-emissions-cars/article-177675>

⁹ “EU Government proposes low carbon transport fuel standard” (January 2007) *Environment News Service*. <http://www.ens-newswire.com/ens/jan2007/2007-01-31-05.asp>

¹⁰ Monahan, Patricia and David Friedman. 2004. The Diesel Dilemma: Diesel’s Role in the Race for Clean Cars. *Union of Concerned Scientists* (p.10). http://www.ucsusa.org/clean_vehicles/technologies_and_fuels/gasoline_and_diesel/the-diesel-dilemma-diesels.html

1.2.2 Step 2 - More benign alternatives are available now or emerging

<p>Availability of more benign technological alternatives (present or emerging) - comparison of the environmental profile of the subsidised product and probable ones) and how the environmental profile of these and modes of production compare to the previously subsidised ones. It should be noted that, at least for the long term availability, this might require some judgement from the analyst (Pieters, 2003).</p>	
<p>1. Are there technologies and products likely to replace the previously subsidised products and modes of production?</p> <ul style="list-style-type: none"> Please note: consider not only domestic technologies/ products but also products/technologies available abroad. 	<p>Yes, biofuels and electric vehicles could replace petrol and diesel to a significant extent in the future. In addition, removal of the subsidy would provide an incentive to make diesel-powered transport more efficient.</p>
<p>2. How do the environmental profiles of these competing products and modes of production compare with those of the previously subsidised ones?</p>	<p>Biofuels could also have potentially harmful effects on the environment. According to a UN report, there could be serious environmental consequences if forests are destroyed and developed into farmland to grow plants for biofuels. Furthermore, research has concluded that using biomass for combined heat and power (CHP), instead of using it for transport fuels, is the best option for reducing greenhouse gas emissions.¹¹ Plug-in cars, on the other hand, if using electricity generated by renewable energy sources, would greatly reduce transportation's effects on the environment.</p>
<p>3. Is the implementation of these alternatives hampered by the subsidy under scrutiny?</p> <ul style="list-style-type: none"> Highlight here if the subsidy has an impact on trade of more benign technologies coming from third countries. If yes, specify what impacts and how important these are. 	<p>Yes, because cheaper diesel reduces the competitiveness of substitute goods and services (petrol, biofuels, electric propulsion, public transport). For example, when prices for petrol increase, people buy more diesel cars.¹²</p>
<p>4. What is the likelihood of these technologies and products to replace the previously subsidised ones?</p>	<p>Over the past few years there has been an increasing amount of research on biofuels and plug-in cars. If fuel subsidies were removed and the cost of fuel significantly increased, this would help to accelerate the development of biofuels and more efficient vehicles.</p>
<ul style="list-style-type: none"> In the light of the above, are there more benign alternatives available now or emerging (YES/NO)? 	<p>Yes – more benign alternatives include existing market-ready technologies and services that are hampered by price competitiveness issues.</p>

¹¹ "UN warns on impacts of biofuels" May 2007. *BBC World News*.
<http://news.bbc.co.uk/2/hi/science/nature/6636467.stm>

¹² "Diesel cars set to outsell petrol" October 2002. *BBC World News*.

1.2.3 Step 3 - Does subsidy conditionality lead to higher production

<p>Some items under step 3 require the use of general equilibrium models. However the use of such models is beyond the purpose of the checklist. The aim of this point should be to detect whether more detailed analysis is required to understand the wider consequences of subsidy removal - note that this step can usefully build on information gathered for Linkage 1 in the quick scan:</p>	
<p>1. Does the subsidy conditionality (i.e. the point of impact of the subsidy – output, input, income or profit, see Linkage 1 of the OECD quick scan) lead to higher production? In order to understand this, the following characteristics of the subsidy need to be understood :</p>	
<ul style="list-style-type: none"> ○ the size of subsidy: 	See point 1.4 in quick scan.
<ul style="list-style-type: none"> ○ elasticities of supply and demand: 	The downstream effects could include a shift in the modality of travel and transport and logistics patterns. There would also be upstream effects on trade and production. As stated in Table 6, demand for diesel will decrease if the subsidy is removed, but the effect on “production and input volumes depend on the relevant price elasticities.”
<ul style="list-style-type: none"> ○ duration of subsidy (e.g. when were they introduced and do they have a sunset clause?): 	Tax-rate discrepancies are long standing. Fuel-excite tax rates are not typically equalised over time and do not have sunset clauses. However, it is an existing Community policy that the tax treatment of petrol and diesel for private use shall gradually be aligned. The EU minimum levels of taxation for petrol and diesel move a bit closer in 2010. In addition, the Commission already proposed their further alignment (per litre) as part of its "commercial diesel proposal".
<ul style="list-style-type: none"> ○ conditionality (e.g. output, income, profits or income? On the importance of conditionalities see OECD, 2005 in Pieters pp.79-85): 	As described in Table 6 below, if the subsidy is reduced/removed in the <i>commercial</i> sector, the industries supply curve will shift upward and therefore reduce quantity supplied at all price levels. As an input subsidy, the subsidy affects the suppliers’ profits. Its effect on production and input volumes depends on the relevant price elasticities.
<ul style="list-style-type: none"> ○ the distribution of market power 	The fossil-fuel industry has attributes of an oligopoly.
<ul style="list-style-type: none"> • In the light of the above points, does the conditionality of the subsidy lead to higher production volumes and therefore rates of exploitation of natural resources? Note that this is considered to be analytically the most difficult task (Pieters, 2003),¹³ hence some qualitative considerations will be acceptable here if more detailed data are not immediately available. 	Yes. The subsidy leads to higher production of diesel fuel and higher rates of exploitation of natural resources by stimulating demand for diesel (at the expenses of petrol, although both products have to be produced at the same time. In consequence, the higher is the demand for diesel, the higher the need for oil as input for refinery and the higher the need to dispose of the unnecessary gasoline through exports). If the subsidy were removed, the price of diesel would increase and create a more level competitive playing field with petrol vehicles and help increase the market opportunities for other types of fuels and other types of transportation (e.g. plug-in vehicles) to enter the market as well as a more efficient use of diesel, thus diminishing lock-in effects.

<http://news.bbc.co.uk/2/hi/business/2332669.stm>

¹³ For more hints from the author on the reasoning behind this step, see sections 1.5 and 2 in Chapter 2 OECD 2005. Note: It is difficult to assess lock-in effects quantitatively, since it would require comparing a “with-situation” to a counterfactual “without-situation” (what technologies would have gained market access in absence of the subsidy?). But subsidies that are maintained over a long period are much more likely to have strong lock-in effects, especially when they also directly influence the choice of materials and energy. Taken from OECD 2005 p. 77.

Summary of the results of the application of the checklist to the case study

<p>1. Is the subsidy removal likely to have significant environmental benefits?</p>	<p>Yes, since it will decrease demand for diesel fuel subsidy removal would diminish environmental impacts both upstream and downstream. Increasing the costs of diesel could help open the market for new, environmentally beneficial technologies and more efficient modes of transportation. Effects would also depend on what happens with other fiscal factors (e.g. circulation and registration taxes based on CO₂ emissions, for example).</p>
<p>2. Is the exclusion criteria system – i.e. YES/NO approach - a valid approach? For example if your answer to the assessment of one step was NO, do you think it was correct to stop the analysis? Explain.</p>	<p>Yes, the exclusion criteria system is logically valid and by creating a way to stop the analysis early it can help speed the analytical process. Stopping the analysis, however, means missing the opportunity to see if a particular subsidy fails on a number of points.</p> <p>In a case where the answers to the questions are “partially yes” then the strict application of the exclusion-criteria logic does not suffice and a more nuanced judgement is required regarding the worthiness of subsidy removal.</p>
<p>3. Is the support worthy of further scrutiny to assess whether their reform/removal would benefit the environment?</p>	<p>No, it is clear that subsidy reform would benefit the environment. The checklist approach does not consider non-environmental aspects important to a decision of whether to reform a subsidy (e.g. whether the original rationale is still valid)—the checklist is not intended to examine these issues, however.</p>
<p>4. What are the impacts on the subsidy on trade (what are they, are they important?).</p>	<p>Subsidies for fuel have important connections to trade. The countries chosen for this case study import oil for fuel. Therefore, a removal of the subsidy would decrease trade and dependence on those countries that produce oil, which is an additional impetus to remove fuel subsidies. The subsidy leads to higher production of diesel fuel and higher rates of exploitation of natural resources by stimulating demand for diesel (at the expenses of petrol, although both products have to be produced at the same time. In consequence, the higher is the demand for diesel, the higher the need for oil as input for refinery and the higher the need to dispose of the unnecessary gasoline through exports).</p> <p>The checklist does not ask any questions relating to trade. Questions about the effects of trade could be integrated into the description of all relevant subsidies. In the case of fuel subsidies however, the impacts on trade do not change the fact that subsidy removal is likely to benefit the environment. This would not be the case for other subsidies, however, e.g. biofuels, so trade considerations are indeed important to consider.</p>

Some additional questions on the use of the checklist

<p>1. Based on the application of the tool to your case study, do you think it possible to use the checklist and produce credible results without employing a general equilibrium model?</p>	<p>Yes. The case study focuses on subsidies to non-commercial diesel (via a lower excise tax rate than petrol). However, we also examined the commercial diesel issue in the subsidy framework as a mean to test the tool. The Q&A format seems ideally suited to examining a single, specific subsidy, however.</p>
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1.3 Testing the INTEGRATED ASSESSMENT FRAMEWORK

1.3.1 Features Scan

The <i>features scan</i> asks in part what the impacts of a subsidy are or could be expected to be in relation to its stated objectives.	
1.1. Subsidy objectives:	
<ul style="list-style-type: none"> • <i>What are the objectives of the subsidy, with respect to its environmental, economic and social impacts?</i> Suggestion: the official objectives may be surmised from the legislative history or statements by officials. The objectives may be expressed in terms of environmental economic or social outcomes or some combination of the three. 	<p>Petrol and diesel excises are levied primarily to raise revenue and are seen in many countries as a means of paying for upkeep of the roads. Since road users are imposing costs on society when using the roads, fuel excises serve as a proxy for the cost of road use and it makes economic sense for them to pay for road maintenance. However, there are other externalities, such as traffic noise, pollution and congestion that the taxes do not take into consideration.</p> <p>However, the difference between taxes on petrol and diesel obviously has a different objective. The main reason for lower tax rates on diesel is the historical use of diesel for business use (in haulage). Some European governments favour diesel over petrol with lower taxes in order to encourage fuel savings. In many EU countries diesel is significantly cheaper per litre than petrol and less duty is paid on it, some governments justify this because diesel engines consume less fuel per kilometre.</p> <p>Diesel is the main fuel used for freight transport and makes up a significant percentage of the operating costs of transport companies. The objective of the <i>commercial-diesel</i> subsidy therefore is to reduce hauliers' transport costs, increasing their profitability and possibly also reducing consumer prices of transported goods.</p>
1.2. Subsidy design:	
<ul style="list-style-type: none"> • <i>Does the policy design avoid problems inherent in long-term existence of subsidies?</i> For example, does it have a sunset clause or an adaptive review process (i.e. does it have an in built review process and are subsidies tied to outcomes not technologies) 	<p>The policy does not have a sunset clause. Subsidy levels are not specifically tied to outcomes. However, it is an existing Community policy that the tax treatment of petrol and diesel for private use shall gradually be aligned. The EU minimum levels of taxation for petrol and diesel move a bit closer in 2010. In addition, the Commission already proposed their further alignment (per litre) as part of its "commercial diesel proposal".</p>
<ul style="list-style-type: none"> • <i>Are the conditionalities right?</i> 	<p>For <i>non-commercial</i> vehicles, the diesel subsidy does contribute to lock-in of diesel engines vis-a-vis other technologies. Its effect on production and input volumes depends on the relevant price elasticities.</p> <p>As described in Table 6 below, if the <i>commercial</i> subsidy is removed, the industries' supply curves will shift upward and therefore reduce supply at all price levels. Since the point of impact for fuel subsidies is those buying diesel fuel as an input to their transportation activity, the subsidy affects the suppliers' profits, and is possibly passed on to consumers in lower prices for transported goods.</p>
<p>1.3. Effectiveness analysis: The effectiveness analysis (i.e. does the subsidy achieve its objectives?) should be based on the stated objectives of the policy. Where such goals are not explicitly stated or cannot be inferred, skip this section. Any environmental or social impacts would be considered unintended and would be addressed in the incidental impacts scan below (section 2 of the integrated assessment). This test is a sort of basic threshold criterion: if the</p>	

subsidy fails at achieving even those objectives for which it aims then it is in need of reform regardless of its incidental impacts. So this is a powerful argument for reform. Possible sources: studies on macro-economic impacts or studies on micro-economic impacts of the subsidy. Please answer the points below.

<ul style="list-style-type: none"> • <i>Does the subsidy achieve the economic impacts that it is expected to achieve?</i> (e.g. correct a market failure; increase the supply of a public good) • What effect does the subsidy have on the (public?) budget and on welfare? 	<p>Fuel excise taxes are regressive in that people on low incomes pay a higher proportion of their incomes in the form of excise than people with higher incomes, given the same fuel use. Therefore, removing the subsidy by raising diesel excise taxes would cause relatively higher impacts on people with lower incomes that drive a diesel car. That said, many people with lower incomes do not own cars, especially not diesel cars, and are thereby exempt from paying the excise taxes. This also implies that the petrol/diesel differentiation as such is regressive because lower income groups that are more likely to drive a petrol car are burdened more than higher income groups that are more likely to drive a diesel car.</p> <p>Costs to <i>commercial</i> hauliers have been reduced and to some extent passed on in the form of lower prices for goods. If the subsidy is interpreted as a user fee for infrastructure, then it has been successful in this regard. The reason for the differing excise rates, however, stems primarily from a political desire to reduce fuel costs for commercial trucking. There is little compelling economic argument for this difference, especially given the environmental harm stemming from fuel consumption and the desire to significantly reduce greenhouse gas emissions from transport. The main effect therefore is on goods that are transported by diesel-fueled transportation. If the subsidy is removed, there is a risk that transportation services will pass the higher cost of fuel onto the customer. If this were the case, it could have a negative effect on consumers' welfare.</p>
<ul style="list-style-type: none"> • <i>Does the subsidy reach the intended recipients?</i> (e.g. improving income distribution generally, reaching a target group with intended benefits; inducing socially desirable behaviour). To answer this question, look at studies that empirically trace the flow of money/distribution of support to the sector in general. 	<p>The main reason for lower tax rates on diesel is the historical use of diesel for business use (in haulage).. In many EU countries diesel is 20% to 25% cheaper per litre than petrol and less duty is paid on it, some governments justify this because according to them, diesel engines consume less fuel per mile.¹⁴ However, based on studies previously mentioned (Monahan and Friedman, UCS), this is not accurate.</p> <p>The <i>commercial</i> subsidy is primarily intended to reduce the price to hauliers of transporting goods by diesel-fueled vehicles. Assuming these are indeed the primary motivations, then yes, the subsidy does reach the intended recipients. The subsidy reaches intended recipients, but apart from that, it has also reaches unintended recipients: the fuel-price advantage attracted private consumers away from gasoline-fueled vehicles and supported the dieselisation of the European car fleet.</p>
<ul style="list-style-type: none"> • <i>Does the subsidy achieve its environmental objectives? – only relevant for those which have them</i> (e.g. reducing pollution; preserving habitat; encouraging the use of an environmentally preferable product, 	<p>The subsidy—though motivated by a supposed comparative efficiency of diesel—also increases environmentally harmful effects. Although diesel engines may consume less fuel per mile, other studies have shown fuel subsidies, which give a fiscal advantage to diesel over petrol fuel cars, are harmful to the environment because diesel engines emit three times more particulate and NOx emissions than petrol engines¹⁵ and more oil is used in the manufacture of diesel. Per litre of fuel, CO₂ emissions are higher for diesel, although diesel-engine efficiency does result in lower average CO₂ emissions on a per-kilometre basis.</p>

¹⁴ “European comparison of taxes on car ownership and use index.” 2005. Commission for Integrated Transport. <http://www.cfit.gov.uk/docs/2001/scot0122/scot0122/06.htm> (15 April 2009).

¹⁵ “Fuel Taxation” August 2004, updated November 2006. EurActiv.com. <http://www.euractiv.com/en/taxation/fuel-taxation/article-117495>

<p>speeding the development of more-efficient or clean technologies). Suggestion: look at studies on pollution from use of resource/subsidised sector.</p>	<p>This is further supported by a policy analysis by EurActiv.¹⁶ Current European legislation (Energy Taxation Directive (2003/96/EC) fixes only a minimum but not a maximum rate for excise duty on diesel. In addition, for all Member States, except the UK, duties on diesel fuel are lower than on unleaded petrol. However, although there is “no justification for this advantage in terms of environmental performance of diesel engines, the number of diesel cars has grown substantially over the last years”¹⁷, while the share of gasoline consumption and gasoline-fuelled vehicles decreased</p> <p>Using ExternE data, Friedrich and Bickel (2001, p. 254) found that the average value of pollution externalities for diesel was 50 eurocents per litre, whereas average external costs for petrol was about 16 eurocents per litre. For each fuel, actual external costs varied widely around their respective averages based on vehicle age, traffic conditions and location (urban versus rural). <i>Note: it is beyond the scope of this case study to do a comprehensive analysis incorporating all external costs of the two fuel types and taking into account current and possible mitigation technologies.</i>¹⁸</p>
<p>1.4. Cost-effectiveness: what alternatives exist for meeting those objectives that might be more cost-effective? In other words, could the objectives of the subsidy be achieved by other, more cost effective policies? Suggestion: one way of doing this is by comparing the cost of subsidy per unit of product with the cost per unit of an equivalent product. Note this step helps set the stage for the analysis of the impacts of policy reform. While collecting new, detailed information on the cost effectiveness of alternative policies, if not readily at hand, can be time consuming and costly, the analyst should at least consider and describe alternative policies</p>	
<ul style="list-style-type: none"> • <i>What alternative policies exist for meeting those objectives?</i> Please describe: 	<p>The policy alternatives include changes to registration and circulation taxes that offset the subsidy to diesel via excise tax rates..</p>

1.3.2 Incidental Impacts

<p>The analysis of incidental impacts asks what impacts have occurred, or might occur, in areas (environmental/economic/social) not foreseen or targeted in the original subsidy design. The stress here is on long-term, dynamic and international impacts (e.g. this includes any impact of the subsidy on foreign producers – which should be noted in the analysis).</p>	
<ul style="list-style-type: none"> • <i>What are the unintended economic impacts of the subsidy?(e.g. unintended economic impacts such as impacts on the prices of factors of production and intermediate inputs used by non-target industries; or economic impacts of social and environmental changes brought by the subsidy).</i> 	<p>One unintended economic impact of the subsidy is on trade. For instance, the EU as a whole has a deficit of close to 30 million tonnes per year of diesel that is largely met by imports from Russia.¹⁹ In the case of the UK this is very severe. During peak demand for diesel fuel, the UK has to import what is estimated to be slightly less than 2 million tonnes per year.²⁰</p>

¹⁶ “Fuel Taxation” August 2004, updated November 2006. *EurActiv.com*.

¹⁷ “Fuel Taxation” August 2004, updated November 2006. *EurActiv.com*.

¹⁸ Friedrich, Rainer and Peter Bickel. 2001. Environmental external costs of transport. Springer. <http://books.google.com/books?id=IhYMchSU0cYC>

¹⁹ “Petrol and diesel price differential.” (December 2008.) *UKpia*. http://www.ukpia.com/industry_issues/marketing/influences_on_petrol_diesel_prices.aspx.

²⁰ “Petrol and diesel price differential.” (December 2008.) *UKpia*. http://www.ukpia.com/industry_issues/marketing/influences_on_petrol_diesel_prices.aspx (15 April 2009).

<ul style="list-style-type: none"> • <i>What are the unintended social impacts of the subsidy? (e.g. socially undesirable distributional impacts such as on low-income consumers, on non-target population generally, on developing country exporters). In order to answer this question Barg et al. (OECD, 2007) suggest describing the characteristics of the various social groups.</i>²¹ • <i>Are there any impacts on social groups in third countries deriving from the existence of the subsidy? If yes, describe them. Are they important?</i> 	<p>Fuel excise taxes are regressive in that people on low incomes pay a higher proportion of their incomes in the form of excise than people with higher incomes, given the same fuel use. Therefore, removing the subsidy by raising diesel excise taxes would cause relatively higher impacts on people with lower-incomes.</p>
<ul style="list-style-type: none"> • <i>What are the unintended environmental impacts of the subsidy? These are mainly linked to primary economic impacts – changes in the levels of inputs and wastes e.g. degradation of ecosystem services; loss of biodiversity, synergistic effects. See also your answer to linkage 3 in the quick scan.</i> 	<p>The unintended environmental impacts of the subsidy are outlined in charts in 2.1 and 3.1 of the Quick Scan. Due to the subsidy, diesel is used more than it otherwise would be, thus causing more environmental damage than petrol and much more than electric transport options.</p>

1.3.3 Long-Term Effectiveness

<p>Too often, a subsidy designed to solve a short term problem may easily become the cause of problems in the longer term. In this section, the analyst needs to ask whether the subsidy is merely treating the symptoms of a larger problem, or whether it actually addresses underlying causes. The assumption is that, if the former is true, the subsidy may in fact be delaying necessary structural change.</p>	
<ul style="list-style-type: none"> • Is the subsidy designed so as to eventually address the economic underlying problems that gave rise to its creation? e.g., by spurring innovation, increasing resource or labour productivity or increasing the supply of a public good? 	<p>No, it is not designed to achieve this. The non-commercial subsidy creates lock-in to diesel technologies, which is not necessarily environmentally advantageous, especially vis-a-vis emerging electric vehicle technologies. The <i>commercial</i> subsidy is designed primarily to keep the costs of diesel-fueled transportation goods low.</p>
<ul style="list-style-type: none"> • Is the subsidy aimed at addressing underlying social problems or to treat symptoms, and therefore perpetuating a social ‘lock-in’? 	<p>The subsidy does not solve an underlying social problem facing operators of vehicles.</p>
<ul style="list-style-type: none"> • Is the subsidy designed to directly address the environmental problems (e.g. problems facing infant industries)? 	<p>No, the subsidy is conceived—at least by some—as a means to support a more fuel-efficient technology than petrol, but in fact on a life-cycle basis, using petrol creates less CO₂ per litre than diesel (and less of other pollutants). It should be noted that on a <i>per kilometre basis</i>, diesel engines create less CO₂ than petrol engines but other policies (e.g. circulation or registration taxes) could be used to cover the comparative performance of vehicle <i>engines</i>.</p>

1.3.4 Policy Reform

This is the final stage in the analytical framework. It involves highlighting the costs and benefits

²¹ Basically this question asks who gains and who loses? This analysis asks first whether a subsidy entails a net benefit or a net cost for non-target populations. Subsidies usually involve a transfer from one segment of the population to another – something which may be justified on social welfare grounds, but which should be made explicit in any impact analysis. Ideally the transfer effects of any subsidy should be neutral or in the direction of a more-equal distribution of wealth or income (and distribution of non-income public goods), and should work to the benefit (or at least not the detriment) of socially marginalized populations.

of the various options for reform, including outright elimination of the subsidy, phased elimination, changed policy design, and alternative measures. The analyst will also need to ask what sorts of flanking measures might be considered as a palliative complement to the various reform options.	
<ul style="list-style-type: none"> What would be the environmental, economic and social impacts of various scenarios for reform of the subsidy, including outright elimination, phased elimination, and change in policy design? Would they differ from a simple reversal of the incidental impacts discussed above? 	<p>If the subsidy were to be phased out, the price of diesel would increase slowly and make it possible for a more gradual transition to greater fuel efficiencies and to other types of fuels (i.e. electric vehicles) and other modes of transport. These results would diminish so called lock-in effects.</p> <p>It is already Community policy to pursue a gradual phase out of diesel subsidies to non-commercial vehicles in order to remove the bias against petrol (note that for commercial vehicles, petrol is not a viable alternative).</p>
<ul style="list-style-type: none"> Where negative impacts are predicted, what sorts of flanking measures might be helpful in addressing the negative impacts? Conditions necessary for successful transition have been analysed by Cox A. in OECD 2007, also some examples of compensation have been included in IEEP et al. (2007) 	<p><i>Commercial diesel:</i> The main negative impact that has been predicted is greater economic hardship for the trucking industry and an increase in the cost of transported goods. This impact could be diminished (but not eliminated) through a gradual equalling of the commercial diesel tax rates with non-commercial diesel and petrol tax rates.</p>
<ul style="list-style-type: none"> What would be the impacts of subsidy reform on trade? Would the removal of a subsidy have spill-over effects, i.e. favouring production overseas, favouring industry moving abroad? And what would be impacts on balance on the environment (please describe your assumptions and base your answer on a literature review – clearly specifying the literature consulted) 	<p>The elimination of the subsidy would reduce diesel imports, but would increase fuel “tourism” as motorists and truckers sought to fuel vehicles outside the borders of the country or region in which the elimination of the subsidy took place. It is already Community policy to pursue a gradual phase out of diesel subsidies to non-commercial vehicles in order to remove the bias against petrol.</p>

Summary of the application of the integrated assessment to the case study	
1. Is the subsidy <u>currently</u> justified by any relevant market failure (<i>such as lack of competition, lack of market transparency, or uninternalised external effects – note these may have been valid reasons for the introduction of a subsidy, but they may have disappeared over time</i>)	The non-commercial subsidy does not correct for a market failure (as diesel is not an environmentally preferable fuel from a lifecycle perspective). The <i>commercial</i> subsidy is justified by some to keep living costs down. However, this is not a market failure. Due to the subsidy, people are not paying the “true cost” for goods.
2. If yes, is there an alternative way to tackle that market failure?	Not applicable (no market failure).
3. Is the subsidy <u>currently</u> justified by any strong social concern? (<i>Note: a number of subsidies were launched where there was a strong social concern, although this may not always still be the case</i>).	The subsidy is justified by some to keep living costs down.
4. If yes, is there an alternative way to tackle that social concern?	For consumers generally, other tax burdens could be reduced by an overall equivalent amount (this would still create winners and losers). A decrease in petrol tax rates would both remove the subsidy and reduce tax burdens.
5. Have there already been attempts to	The United Kingdom taxes non-commercial petrol and diesel to

<p>remove this subsidy, and if yes, why they failed? (<i>eg opposition by vested interests, public perception concerns, lack of political will given negotiating capital</i>)</p>	<p>the same extent, thus it no longer subsidises diesel for non-commercial purposes (note that due to the differing energy content of the fuels, a case could be made that per-litre equality actually still favours diesel fuel relative to petrol).</p> <p>Excise taxes on <i>commercial</i> diesel are still significantly lower in the UK than non-commercial rates. Still, in the last year, there have been several protests by the trucking industry in Great Britain that the cost of commercial diesel is too high, which points to the difficulty in removing this particular subsidy</p> <p>Other countries, although not removing the non-commercial subsidy, have lessened it. The government in the Netherlands decided to increase the excise duty on diesel by 3 cents a litre on 1 July 2008 and by an additional 1 cent per litre on 1 January 2009. The reason given was that compared to petrol, diesel-fuelled vehicles emit higher percentages of fine particles and CO₂.²²</p>
<p>6. Could you make recommendations on possible compensation measures that could be used to palliate impact of removal?</p>	<p>The elimination of the subsidy could be done as a gradual process, sending a signal that would inform near-term purchases of new technology (and thus reduce buyers' future fuel costs as subsidy reform progressed).</p>
<p>7. What would be the impacts on trade of the subsidy removal? Will it have any global environmental impacts?</p>	<p>Removing the subsidy would reduce overall fuel demand to some extent and therefore reduce petroleum and diesel imports, though if done only in certain Member States could increase the problem of fuel tourism to the extent intra-fuel discrepancies increase among the excise-tax rates of neighbouring Member States.</p>

2 COMPANY CAR TAXATION IN THE NETHERLANDS

2.1 Testing the QUICK SCAN MODEL

2.1.1 *Linkage 1 - the impact of the support on the volume and composition of output in the economy*

<p>1. Linkage 1 - <i>the impact of the support on the volume and composition of output in the economy</i>. This identifies the link between the type of subsidy, its point of impact (input, output, profit or income), the price elasticity of demand and supply associated with the activity subsidised and ultimately the impacts on the levels of production and consumption. This in turn is what creates pressure on the environment. The following points are required to describe the linkage.</p>	
<p>1.1. <i>Describe the type of subsidy</i></p>	<p>The focus of the analysis are company cars provided by employers, owned or leased by employers, provided to employees as a fringe benefit for private use. It does not really fit into the typology used in OECD (1998, ch. 3), as it is a subsidy to consumption rather than to production. In terms of Table 1 in Section 5, it is an on-budget subsidy to output.</p> <p>Company cars are provided to employees by firms at an implicit unit price that is much lower than the employee would pay in the goods market. This is why employees choose company car instead of other benefits or salary. Only when a company car is extremely productive to the company this high tax advantage could be justified. Instead, research shows that in the Netherlands company cars are mainly provided for private use: only 22% of company cars are used for business purposes (Gutierrez-i-</p>

²² "Fact sheet Greener Tax System: 2008 Tax Plan: De Jager takes firm action for a greener tax system". September 2007.

	<p>Puigarnau and van Ommeren, 2009; hereafter: G&O). The Netherlands are not different from other European countries in this respect. The taxation of the private use of company cars in the Netherlands is much lower than the taxation of an equivalent amount of monetary income. This creates a distortion in taxation levels and a loss in terms of taxes collected. Commuting is assimilated to business mileage and does not count as private use for taxation purposes (the threshold for fringe benefits taxation is 500km/year for private purposes, excluding commuting): 12% of company car drivers do not drive beyond this and therefore enjoy company cars tax exempt. Moreover, fuel is often provided for free by employers, which reduces company car marginal cost of car use to zero. This is also true if the employee pays a fixed amount to his employer for his private use of the company car. Company car taxation thus encourages additional mileage, especially for commuting. The following taxation provisions are considered as a distortionary subsidy to company cars:</p> <ol style="list-style-type: none"> 1) The fringe benefit is taxed at a rate below the optimal level (the optimal level, according to G&O, would be 51% of the car's value; the actual level is 25%, and even less for low-emission cars; see below). 2) Effective exemption from VAT for purchase, repairs and fuel, if paid by the employer (standard value: 19%)(companies can deduct the VAT paid from VAT received on their sales). 3) The private use of company cars by employees who use them less than 500 km per year for private purposes remains untaxed.
<p>1.2. <i>What is the point of impact (conditional ity) of the subsidy</i></p>	<p>The subsidy is conditional on the use of company cars by employees for private purposes. The subsidy has the following points of impact:</p> <ul style="list-style-type: none"> - Car provision: The employee does not pay for the car (or the car lease) including insurance, repairs, taxes and fuel. - Private use of company cars: the income tax system in the Netherlands taxes the use of a company lease car to the extent it is used for private use. <i>This is done to reduce the advantage of company cars in terms of private use.</i> If the mileage for private use remains below 500 km/yr (to be proven with a detailed travel administration), <i>excluding commuting</i>, no amount is added to the taxable income. If the mileage is above 500 km/yr, 25% of the book value of the car is added (incl. VAT). For 'very clean' cars (CO₂ <110 g/km for petrol/LPG and < 95 g/km for diesel) it is reduced to 14%. Since 1.1.2009, there is an intermediate rate of 20% for 'clean' cars (CO₂ < 140 g/km for petrol/LPG and < 116 g/km for diesel). - Commuting distance: in most European countries, a company car is exempted from any imputed tax when the number of private kilometres is less than a certain threshold value. In the Netherlands, the threshold value is 500 kilometres per year excluding commuting. - Fuel use: It is common that the employer pays for all fuel consumption, including the fuel used for private trips.
<p>1.3. <i>What are the intended recipients of the subsidy</i></p>	<p>There are two main intended recipients for the subsidy:</p> <ul style="list-style-type: none"> - Employers: company cars are considered productive for employers. - Economy: company cars are considered productive to the economy. <p>The subsidies' benefits partly <i>leak</i> to other recipients:</p> <ul style="list-style-type: none"> - Employees: enjoy private car use at a much lower price than they would pay for it on the market. Subsidised company cars as fringe benefits, increase consumption and free family income. - It can be argued that car manufacturers indirectly benefit from this subsidy, as it incentivises more sales, especially on the upper end of the market.
<p>1.4. <i>Size of the subsidy</i></p>	<p>According to economic theory, a company car should be accounted for as employee's income and be taxed according to the firm's <i>net</i> costs of providing the company car to the employee, defined as the firm's gross costs minus the costs for business travel with this car, because costs of business usage of a company car should not be taxed (see Clotfelter, 1983; Katz and Mankiw, 1985 in G&O, 2009). Only when the company car is not or hardly used for business purposes, which is around 78% of company cars in the Netherlands (G&O, 2009), then the firm's gross costs are equal to the net costs.</p> <p>In the Netherlands, the average purchase price of a company car in 2006 is (about) €17,000, so each year 25% of this cost (€4,250) is added to the employees' taxable income when a company car is provided. The firm's average annual net costs appear to</p>

	<p>be in the range of €6,300 to €10,500 (average 8,700), much more than the €4,250 imputed by the tax authorities. Hence, employees that receive a company car face a <i>much</i> lower price than they would pay in the car market and are therefore expected to increase their demand for cars in various ways. The implicit price subsidy given to employees is equal to 4,450€ annually (8,700€-4250€). The annual net costs of owning a car is about double than what the employee pays for under the current taxation scheme. In order to account for this the taxable income for the employee should be increased from 25% to 51% of the car's book value.</p> <p>Given a marginal income tax of 42% (middle income bracket) or 52% (higher income bracket), the value of taxes foregone due to the current level of taxation of company cars is between 21.48% (1,869€) and 26.59% (2,314€) of total net annual cost of ownership of a company car. Considering, in addition to the income tax advantage, the non payment of VAT for purchase and repairs (which in the Netherlands are 19% and apply to 40% of net annual costs of a car), the total value of tax foregone is between 2,530€ (29% of annual cost of owning a car) and 2,975€ (34% of annual cost of owning a car). The total number of company cars in the Netherlands is 873, 091 (CBS, 2008), therefore the total tax foregone by the government is between:</p> <ul style="list-style-type: none"> o 2,530€ * 873, 091 = 2,208,920,230€ (middle income bracket) and o 2,975€ * 873, 091 = 2,597,445,725€ (higher income bracket) <p>As most users of a company car are likely to be in higher income classes, the upper end of this range seems the most likely one. Moreover, the size of the subsidy is even higher if one accounts for the additional tax loss attributable to the introduction of discounts for cleaner cars (14 and 20%).</p>
1.5. Description of the sector	The subsidised industry is very broad: it includes small and medium enterprises and big corporate companies, across the services and industry sectors, it is therefore not possible to generalise demand and supply conditions.
1.6. Price elasticity of demand and supply of the input and output markets.	<p>Price elasticities do not influence employees' attitudes towards the choice of taking or not taking a company car. The elasticities seem to impact on the probability of having more cars at the household level and to choose bigger cars, to a lower extent also on the distance travelled. Price elasticity of supply is thought to be relatively inelastic.</p> <p>In order to determine the welfare effects of distortionary taxation on (consumer) goods, it is usually sufficient to know:</p> <ul style="list-style-type: none"> - the change in the price of the good due to taxation (<i>in the case of company cars it would be sufficient to know the average reduction in the price paid by the employee for the company car</i>), and - the demand price elasticity to determine the change in consumption due to change in the price of the good (<i>in the case of company cars the effect of company car price reduction on the demand for cars</i>) <p>The effect of company car taxation on the demand for cars <i>cannot</i> be derived from standard demand elasticities (e.g., provided by the empirical transport literature), because the effect of favourable taxation of company cars on household car demand may be quite different from general car price reductions. General price reductions affect the prices of all cars in the household, whereas favourable taxation of company cars affects only company cars in the household. This implies that the results of studies that focus on general car price elasticities are only indicative.</p> <p>G&O (2009) attempted to calculate the impact that the reduced price for company cars has on the probability of having more than one car in a household and on the probability of these being larger than they would be if the employee received a higher wage instead (the counterfactual).</p> <ul style="list-style-type: none"> - Impact on numbers of cars in households: G&O (2009) consider the (long-run) <i>fuel price</i> 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 <i>through free fuel only</i> by, on average, 25% (-100 × -0.25), if all company car owners receive free fuel for private travel. The (long-run) <i>car</i>

	<p><i>price</i> 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 find that company car possession increases the number of cars in the household 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.</p> <ul style="list-style-type: none"> - Impact on the value (and size) of the car: In summary, the study estimates that company cars are likely to be more expensive than the counterfactual value of the most expensive car in the household, by about 9,000€ to 12,000€. As the value of the car is highly correlated to the size of the car, it results that company cars are larger than the counterfactual. Working backwards, the implied price elasticity of the most expensive car in the household is about -2. As a result, the study estimates that the annual welfare losses per company car due to a shift to more expensive cars is about €700, or 8% of the total annual costs of the car, equal to a total loss of around €560 million in the Netherlands. G&O (2009) recommend to increase the tax on company cars to reduce the welfare loss incurred. - Impact on distance travelled: The impact on private travel is considered to be small, as elasticities for car use with respect to variable costs are very small, particularly for high income groups (Jorgensen and Dargay, 2007). The impact on travelling for commuting is instead found to be significant (additional 1,500km/year) which accounting also for the externalities, results in €200 per year welfare loss per company car. <p>The three impacts described above amount to €900 per year in welfare losses per company car.</p>
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2.1.2 Linkage 2 – The mitigating effect of environmental policies in place

<p>2. Linkage 2 – The mitigating effect of environmental policies in place – which takes into consideration policies and emission abatement techniques. Linkage 2 measures the emissions or environmental impacts that result from a volume of activity excluding those ‘filtered’ by environmental policies.</p>	
<p>2.1. Are there any environmental policies in place or emission abatement techniques which mitigate the impacts of the support?</p>	<ul style="list-style-type: none"> • A wide range of policy instruments is applied to reduce the environmental impact of cars, including those based on EU legislation. Below, only the fiscal instruments to promote ‘cleaner’ cars are mentioned: <ul style="list-style-type: none"> - Incentives for the purchase of clean cars: diesel cars equal or less than 95gram/km and petrol equal or less than 110 gram/km CO₂ do not pay registration tax, and pay only 25% of the standard rate for the annual circulating tax. - Electric cars are also exempted from the registration tax. Hybrid cars enjoy rebates on registration taxes until 2010. - Increased registration tax rates for cars with very high CO₂ emissions (petrol: > 205 gram/km; diesel: > 170 gram/km). - Incentive for particulate matter filter: a discount is applied on registration tax by €600 for 2009, 300€ for 2010 and <i>nihil</i> for 2011. - CO₂ <i>bonus-malus</i> system on the registration tax. The different bands of payment correspond to the relative fuel efficiency of car energy labels (bonus for A and B; malus for D through G). - Lower income tax for employees driving cleaner company cars: the environmental differentiation of tax rates for the private use of company cars in NL was introduced on 1.1.2008. This differentiation implied that the general rate for the taxable income from company cars was increased from 22 to 25% of the value of the car. For ‘very clean’ cars (CO₂ <110 g/km for petrol/LPG and < 95 g/km for diesel) the rate was reduced to 14%. On 1.1.2009, 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.
<p>2.2. What are the impacts of the environmental policies</p>	<p>A full discussion of the impact of environmental policies concerning cars is clearly beyond the scope of this case study. We will restrict ourselves here to the impact of the income tax reduction for employees driving ‘cleaner’ company cars. Even though only a small number of car types meet the criteria for ‘very clean’ cars to be eligible for the</p>

in place?	<p>income tax discount (<110gCO₂/km), their market share showed already a significant growth in 2008 (which is all the more remarkable since most of them are small cars that are not very popular as business cars). In 2007, the number of newly leased (non-diesel) passenger cars with CO₂ <110 g/km was 3,000; in 2008 it increased to 12,100 (a growth in market share from 3.9 to 15.4%) (VNA, 2008). The overall number of cars in the lease fleet however increased by 6% between 2007 and 2008, suggesting the taxation levels did not have an impact on the overall number of cars in the fleet in 2008.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4">Total lease cars in the Netherlands *</th> </tr> <tr> <th>Type of vehicle</th> <th>2007</th> <th>2008</th> <th>Change '07-'08</th> </tr> </thead> <tbody> <tr> <td>Passenger car</td> <td>531300</td> <td>563300</td> <td>+6%</td> </tr> <tr> <td>Van</td> <td>127000</td> <td>133500</td> <td>+5.10%</td> </tr> <tr> <td>Total</td> <td>658300</td> <td>696800</td> <td>+5.80%</td> </tr> </tbody> </table> <p>*Cars older than 6 years excluded (VNA, 2008. Vehicle Leasing Market. Annual Figures for 2008. Association of Dutch Vehicle Leasing Companies (VNA), Bunnik, the Netherlands.)</p> <p>Number of newly registered lease cars (non diesel)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>CO₂-class (g/km)</th> <th colspan="2">2007</th> <th colspan="2">2008</th> <th>Change '07-'08</th> </tr> </thead> <tbody> <tr> <td>110 and lower</td> <td>3000</td> <td>3,9%</td> <td>12100</td> <td>15,4%</td> <td>305,5%</td> </tr> <tr> <td>111-140</td> <td>8700</td> <td>11,2%</td> <td>12100</td> <td>15,5%</td> <td>40,4%</td> </tr> <tr> <td>141 en higher</td> <td>65200</td> <td>84,3%</td> <td>54100</td> <td>68,9%</td> <td>-17,0%</td> </tr> <tr> <td>Unknown</td> <td>500</td> <td>0,6%</td> <td>200</td> <td>0,3%</td> <td>-55,9%</td> </tr> <tr> <td>Total</td> <td>77300</td> <td>100%</td> <td>78600</td> <td>100%</td> <td>1,7%</td> </tr> </tbody> </table> <p>(VNA, 2008. Vehicle Leasing Market. Annual Figures for 2008. Association of Dutch Vehicle Leasing Companies (VNA), Bunnik, the Netherlands.)</p> <p>From a welfare effects perspective, G&O (2009) calculated that each % added to the income tax generates welfare benefits of €25 per company car. With respect to the discount for cleaner cars this is thought to bring welfare effects only if employees as a consequence choose smaller cars.</p>	Total lease cars in the Netherlands *				Type of vehicle	2007	2008	Change '07-'08	Passenger car	531300	563300	+6%	Van	127000	133500	+5.10%	Total	658300	696800	+5.80%	CO ₂ -class (g/km)	2007		2008		Change '07-'08	110 and lower	3000	3,9%	12100	15,4%	305,5%	111-140	8700	11,2%	12100	15,5%	40,4%	141 en higher	65200	84,3%	54100	68,9%	-17,0%	Unknown	500	0,6%	200	0,3%	-55,9%	Total	77300	100%	78600	100%	1,7%
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2.1.3 Linkage 3 - the assimilative capacity of the affected environment

<p>3. Linkage 3 - the assimilative capacity of the affected environment – which represents the dose response relationship taking into account the assimilative capacity of the environment. This might be a highly site specific factor, particularly when the emissions have predominantly local or regional effects, therefore evaluated through dedicated studies. However, in the case of pollutants that have global effects (like CO₂ emissions or CFCs) effects are not site specific and general conclusions can be drawn.</p>	
<p>3.1. First, could you describe what the size of the environmental damage is? Where possible could you quantify? Otherwise, describe qualitatively</p>	<p>The impacts on the environment of the special tax treatment of company cars is due to the following impacts compared to the counterfactual situation (employees do not receive a company car for private use and commuting but receive a higher wage):</p> <ul style="list-style-type: none"> - Drivers drive longer distances than they would if no company car was provided - Drivers drive a larger car than they would otherwise - There are more cars around than there would be otherwise <p>In more detail:</p> <ul style="list-style-type: none"> - Additional mileage: we assume that travel by company car for business purposes is the most effective way of getting to destination. We assume that the impact on private mileage is very little as a reduction in variable costs for higher income groups have a smaller impact: G&O (2009) find no impact on work days travel an only a small impact (330km/year) on weekend days. There is instead an impact on commuting distances. Data from 2005 (in Graus W. and Worrel E., 2008) show 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 G&O to be limited to 1,200 km per

	<p>year with respect to the counterfactual. Additional travel for private and commuting purposes are therefore estimated to account for a welfare loss of 200€ per year per company car (of which 100€ for the externalities): in total 174,618,200€ per year in welfare losses of which 87,309,100€ in external costs. Additional mileage has impacts on emissions levels of air pollutants, as well as on congestion levels and other externalities including increasing levels of accidents.</p> <ul style="list-style-type: none"> - Size of the car: many studies have now confirmed that company cars taxation has an impact on the size of the car which is larger than it would be otherwise. In the Netherlands, the company cars fleets have higher proportions of medium-large and large cars than private cars (Small-medium: Volkswagen golf: 26%; Medium – large: Toyota Avensis: 34%; Large - BMW series 5: 12%). We have discussed the impact in terms of welfare effects when discussing price elasticities. This is partially compensated by the higher number of diesels in comparison to the private cars fleet, with associated lower fuel consumption and less CO₂ (company car fleet composition: 48% diesel; 48% petrol; 3% LPG and 2% hybrid (VNA, 2008)), but higher PM. While the dieselisation of the fleet is likely to have aided CO₂ emissions reduction efforts, local air quality has suffered due to the higher levels found in diesel of pollutants such as nitrous oxides and particulates. - Are there more cars than there would otherwise be? As discussed under point 1.6 of this tool, the subsidy inflates the levels of car purchases in households that receive a company car. Moreover, the existence of company car systems mean that more cars are purchased, which are larger, with effect on the affordability of larger cars through the second hand market, giving access to larger cars to a broader social base, increasing for the number of larger cars on the car market than there would be otherwise.
<p>3.2. Could you provide insights on the assimilative capacity of the environment to these impacts?</p>	<p>This is not relevant for the present case. Each additional tonne of greenhouse gases emitted (as well as other emissions from fuel use) can be supposed to contribute to environmental damage.</p>

Summary of the results of the application of the quick scan to the case study	
<p>1. Is the support likely to have a negative impact on the environment?</p>	<p>Yes. Moreover, the subsidy has negative impacts to the extent that it does not discourage the use of the car and encourage alternative modes for commuting and business purposes.</p>
<p>2. Does the support succeed in transferring income to the intended recipient?</p>	<p>Yes, but with deadweight welfare losses.</p>
<p>3. Is the support worthy of further scrutiny to assess whether their reform/removal would benefit the environment?</p>	<p>Yes.</p>
<p>4. What are the impacts on the subsidy on trade? Are they important? How likely it is that if you remove a subsidy in country X, it will have any global environmental impacts?</p>	<p>Not relevant.</p>

Some additional questions on the use of the quick scan

The OECD 2005 (p.35) criticises the quick scan method, as not so easy to apply method. In particular, the linkages portrayed by quick scan model can be assessed only through the use of general equilibrium models. The technical and resource constraints of policy makers makes it not always possible to use such models and is 'generally necessary to adopt a more pragmatic and simplified approach.

Based on the application of the tool to your case study, do you think it possible to use the quick scan and produce credible results without employing a general equilibrium model and environmental impact evaluation techniques?

Yes.

2.2 Testing the CHECKLIST

2.2.1 Step 1 – Does the policy filter effectively limits environmental damage?

<p>Is there an environmental policy filter (e.g. size of tradable quota after subsidy removal; level of standards; production limits; rates of environmental taxation; demand and supply elasticities of taxed item etc) which mitigates the effects of a subsidy in the environment? If effective, the removal of the subsidies will bring no or little benefit. Note this section could usefully build on the information collected for analysing linkage 2 in the quick scan.</p>	
1. Describe the environmental policy filter	See quick scan point 2.1.
2. What restrictions to production, pollution or resource depletion levels result from the policy filter?	See quick scan point 2.2.
3. What will happen to the policy filter once the subsidies are removed? See example on p.90 OECD 2005.	If the subsidy was to be removed and the taxation distortions redressed, a differentiation on the basis of the CO ₂ of the car can be kept. In general, there is no reason to expect that the subsidy removal (i.e. a higher income tax to be paid by company car drivers) would lead to less stringent policies on car emissions.
<ul style="list-style-type: none"> • In the light of the above answers, is the policy filter effective in mitigating the environmental impacts caused by the subsidy? <ul style="list-style-type: none"> ○ YES - the policy filter is effective in limiting environmental damage. Then the subsidy's removal is not likely to have significant environmental benefits. The use of the checklist ends here. ○ NO - if the policy filter is found to be not effective in limiting environmental damage, then you should move to step 2. • Please justify your answer. 	To a limited extent. Policies addressed at greening the company cars have an effect on the CO ₂ levels of the fleet and in reducing the number of company cars offered in the first place (it is too early to judge the impact in the Netherlands; in the UK tax rates varying from 10% to 35% for the most polluting models had a significant impact in this respect). However it is likely that to have a larger impact, rates would need to be increased to above 25%, free fuel benefit will need to be taxed, and most importantly alternative policies for commuting and business purposes need to be promoted and ensured, not least to ensure policy coherence and the full effectiveness of road taxes.

2.2.2 Step 2 - More benign alternatives are available now or emerging

<p>Availability of more benign technological alternatives (present or emerging) - comparison of the environmental profile of the subsidised product and probable ones) and how the environmental profile of these and modes of production compare to the previously subsidised ones. It should be noted that, at least for the long term availability, this might require some judgement from the analyst (Pieters, 2003).</p>	
<p>1. Are there technologies and products likely to replace the previously subsidised products and modes of production?</p> <ul style="list-style-type: none"> • Please note: consider not only domestic technologies/ products but also 	<p>Rather than technological alternatives, which include cleaner cars (already within the scope of the actual company car scheme) there are non-technological measures which could replace part of the travel services provided by company cars. These include travel management initiatives, for commuting as well as for business purposes: e.g car sharing, car pooling, and public transport. Relocation benefits or public travel vouchers for employees who live far from the work place are also an attractive alternative to company cars.</p>

<p>products/technologies available abroad.</p>	<p>In the UK, alternative forms of remuneration were offered to employees opting out of company car, however these deserve some attention as their environmental performances not always compare favourably with respect to company cars (see point 2 below): cash (is the most common option); structured Employee Car Ownership Schemes (ECOS); Approved Mileage Allowance Payments (AMAPs) for employees using a private car for business journeys; company vans (less common than the options above); other non-cash benefits, for example, private medical insurance, extra holiday entitlement, vouchers for childcare provision (the least common option) (HMRC, 2006:11). See below for environmental profiles.</p>
<p>2. How do the environmental profiles of these competing products and modes of production compare with those of the previously subsidised ones?</p>	<p>The environmental profiles of travel management initiatives, transport benefits (other than company cars) and relocation benefits compare very positively with the environmental profile of company cars. The UK reform, provides some interesting examples of the results in terms of environmental profiles of alternative forms of remuneration to a company car, which might in some cases dilute the positive effects of the reform:</p> <ul style="list-style-type: none"> - Cash: No direct negative impacts; potential large indirect impacts: private cars chosen in place of company cars tend to have, on average, 5g/km higher CO₂ emissions. Possible explanations for this are numerous, and cannot be definitively determined. They include (HMRC, 2006; HMRC, 2007); <ul style="list-style-type: none"> o employees may purchase older, cheaper (less green) cars in order to use the cash allowance elsewhere in their lives; o employees may choose to purchase older (less green) cars in order to acquire larger / higher status cars more cheaply; and o employees may purchase vehicles with larger engines that they could otherwise not afford. - Employee Car Ownership Scheme (ECOS): There is some evidence to suggest that an average ECOS vehicle has a 20g/km higher level of CO₂ emissions than an average company car – however, this figure is based on a comparison of the whole ECOS fleet with the whole company car fleet, and does not mean that every ECOS vehicle will have a higher environmental impact as standard. On the other hand, some ECOS are managed with the environment in mind and so have lower CO₂ emissions (HMRC, 2007:19). - Approved Mileage Allowance Payments(AMAPs): <ul style="list-style-type: none"> o A key element in ECOS, but mileage must be recorded correctly. Some employers have been found to average the miles driven across the whole ECOS fleet in order to record the maximum possible number of miles at the 40p tax free rate. Some employers keep insufficient data to accurately track cumulative business miles (HMRC, 2007:15) o When paid to employees using private cars for business journeys: if an employee believes his actual motoring costs are less than 40p per mile, he perceives that he stands to make a profit and so has the incentive to drive more miles to increase this profit (HMRC, 2007:15).
<p>3. Is the implementation of these alternatives hampered by the subsidy under scrutiny?</p>	<p>Yes.</p>
<p>4. What is the likelihood of these technologies and products to replace the previously subsidised ones?</p>	<p>It is likely that these technologies, products and measures replace the use of company cars. These policies require specific action from companies and government.</p>

2.2.3 Step 3 - Does subsidy conditionality lead to higher production?

Some items under step 3 require the use of general equilibrium models. However the use of such models is beyond the purpose of the checklist. The aim of this point should be to detect whether more detailed analysis is required to understand the wider consequences of subsidy removal - note that this step can usefully build on information gathered for Linkage 1 in the quick scan :	
Does the subsidy conditionality (i.e. the point of impact of the subsidy – output, input, income or profit, see Linkage 1 of the OECD quick scan) lead to higher production? In order to understand this, the following characteristics of the subsidy need to be understood :	
○ the size of subsidy:	See quick scan.
○ elasticities of supply and demand:	See quick scan.
○ duration of subsidy (e.g. when were they introduced and do they have a sunset clause?):	Since the '70s.
○ conditionality (e.g. output, income, profits or income? On the importance of conditionalities see OECD, 2005 in Pieters pp.79-85):	See quick scan.
○ the distribution of market power (please identify the degree of concentration of factor and goods markets e.g. monopoly, free market):	See quick scan.
In the light of the above points, does the conditionality of the subsidy lead to higher production volumes and therefore rates of exploitation of natural resources ? Note that this is considered to be analytically the most difficult task (Pieters, 2003), hence some qualitative considerations will be acceptable here if more detailed data are not immediately available.	YES. It increases the levels of consumption of car units (demand for larger cars) and demand for travel by car (especially for commuting).

Summary of the results of the application of the checklist to the case study	
1. Is the subsidy removal likely to have significant environmental benefits?	Yes. However, potential leakage to other less environmentally friendly schemes must be avoided. Proper alternative policies must be put in place to promote alternative modes for commuting and to disincentive the use of the car. Relocation benefits should be made more attractive.
2. Is the exclusion criteria system – i.e. YES/NO approach - a valid approach? For example if your answer to the assessment of one step was NO, do you think it was correct to stop the analysis? Explain.	Yes. It is a useful quick guide for policy makers, highlighting the aspects that might need further assessment.
3. Is the support worthy of further scrutiny to assess whether their reform/removal would benefit the environment?	Yes.
4. What are the impacts on the subsidy on trade (what are they, are they important?).	N/a

Some additional questions on the use of the checklist	
Based on the application of the tool to your case study, do you think it possible to use the checklist and produce credible results without employing a general equilibrium model?	Yes.

2.3 Testing the INTEGRATED ASSESSMENT FRAMEWORK

2.3.1 Features Scan

The <i>features scan</i> asks in part what the impacts of a subsidy are or could be expected to be in relation to its stated objectives.	
1.1 Subsidy objectives:	
<ul style="list-style-type: none"> • <i>What are the objectives of the subsidy, with respect to its environmental, economic and social impacts?</i> 	<p>To our knowledge, there are no explicit motives why a company car (as an ‘in kind’ income component) is taxed at a lower level than other income components. However, one could conceive of some implicit economic and social objectives underlying the preferential tax treatment of company cars.</p> <p>Economic objectives:</p> <ul style="list-style-type: none"> - Company cars are considered productive fringe benefits, and as such must receive a special tax treatment. As productive fringe benefits company cars must: a) provide additional revenue to the employer that provides the company car and b) be productive to the economy, as they must enhance revenue in the economy. - Company cars are seen as a measure to increase labour supply (attracting professional personnel and enhancing productivity of personnel) - Keep wages lower than they would be otherwise and reduce business taxes on wages. - Company cars promote consumption of cars and fuel. <p>Social objectives:</p> <ol style="list-style-type: none"> 1) Promoting employment of personnel who cannot afford to live in urban areas.
1.2 Subsidy design:	
<ul style="list-style-type: none"> • <i>Does the policy design avoid problems inherent in long-term existence of subsidies? For example, does it have a sunset clause or an adaptive review process (i.e. does it have an in built review process and are subsidies tied to outcomes not technologies)</i> 	<p>The policy is a long-term policy, since it has been in place since the ‘70s. It has been reformed various times, recently in 2001, 2004, 2008, 2009 but we are not aware of in-built reviewing process.</p>
<ul style="list-style-type: none"> • <i>Are the conditionalities right?</i> 	<p>See quick scan and checklist.</p> <p>The subsidy is conditional on the provision of company cars for private use and for commuting.</p>
<p>1.3. Effectiveness analysis: The effectiveness analysis (i.e. does the subsidy achieve its objectives?) should be based on the stated objectives of the policy. Where such goals are not explicitly stated or cannot be inferred, skip this section. Any environmental or social impacts would be considered unintended and would be addressed in the incidental impacts scan below (section 2 of the integrated assessment). This test is a sort of basic threshold criterion: if the subsidy fails at achieving even those objectives for which it aims then it is in need of reform regardless of its incidental impacts. So this is a powerful argument for reform. Possible sources: studies on macro-economic impacts or studies on micro-economic impacts of the subsidy. Please</p>	

answer the points below.	
<ul style="list-style-type: none"> • Does the subsidy achieve the economic impacts that it is expected to achieve? (e.g. correct a market failure; increase the supply of a public good) • What effect does the subsidy have on the (public?) budget and on welfare? 	<p>The main economic objective, to provide additional revenue to the employer and to the economy through an increase in productivity, seems to be not valid, for the following main reasons (G&O, 2009):</p> <ul style="list-style-type: none"> - A very small proportion of company cars are productive to the economy because a substantial proportion of company cars in the Netherlands (around 90%) are not or hardly used for business purposes; - A private car is generally available to the employee anyway; - Increase of status might be productive for the company but not for the economy (status is a positional good); - More expensive cars do not reduce fatigue of employees, therefore they are not productive; and - Enjoyment of expensive cars is on the job consumption not an increase in productivity. - In terms of increasing productivity thanks to an impact on the number of hours worked, the effect of favourable taxation of company cars on labour supply seems to be negligible. The number of hours worked for full-time positions depends mainly on the employees' hourly compensation, and less on fringe benefits, such as company cars, that are usually given independently of the number of hours worked (Ehrenberg and Smith, 2003 quoted in G&O, 2009). Labour supply effects in the economy are mainly due to the variation in female labour participation rather than by the number of hours worked. <p>Mainly company cars have become a perk, a bonus, but they still succeed as a way of not taxing businesses. The extent to which the latter however is used was possibly not intentional.</p> <p>See the quick scan for the impact on budget (size of subsidy) and welfare effects.</p> <p>Impact on welfare: G&O (2009) calculate that favourable taxation of company cars generates a welfare loss due to a shift towards more expensive cars of about €700 per company car per year). The welfare loss due to increased car travel turned out to be smaller (about €200 per year). So, favourable taxation of company cars generates a welfare loss of about €900 per year per company car. This amounts to around €700 million in welfare losses in the Netherlands. For the whole of Europe, the deadweight loss is estimated to be about 18 billion € per year.</p>
<ul style="list-style-type: none"> • Does the subsidy reach the intended recipients? (e.g. improving income distribution generally, reaching a target group with intended benefits; inducing socially desirable behaviour). To answer this question, look at studies that empirically trace the flow of money/ distribution of support to the sector in general. Note that if a subsidy is targeted at a particular group, if this segment does not receive all or most of the benefits, then the subsidy fails at a basic level. So this is a powerful argument for reform. 	<p>The main intended recipients for the subsidy are businesses, and the economy as a whole. The analysis shows that the subsidy does reach the intended recipients, but not by increasing productivity (original objective):</p> <ul style="list-style-type: none"> - The subsidy is not effective in increasing the productivity of businesses. While it is arguably effective in reducing taxes on businesses labour costs (see question above). - In terms of equity of distribution of the benefit and income, the policy is not effective. Data show that in the Netherlands, females are much less likely to receive a company car than males, notably this is even more so for females with part-time jobs (who are more likely to stop working because of changes in taxation). The Netherlands occupy an average position on this aspect in the EU. - In terms of increasing businesses' capacity to attract professional staff, evidence shows that employees would prefer relocation costs and higher wages to company cars, if there was no tax advantage attached to company cars. - In terms of promoting employment of social groups who cannot afford living in urban areas, company cars are provided to social groups from middle-high income groups, who can arguably afford travel expenses and a car. Relocation benefits are a more beneficial solution for society as a whole (see van Ommeren, 2006).

<ul style="list-style-type: none"> Does the subsidy achieve its environmental objectives? – only relevant for those which have them 	<p>See impact of environmental policy filter in quick scan and checklist on the impact of the environmental policy.</p> <p>The lower tax rate on the fringe benefit for very clean cars has had an impact in the increase in the number of new registrations of vehicles with <110gCO₂/km.</p>
<p>1.4. Cost-effectiveness: what alternatives exist for meeting those objectives that might be more cost-effective? In other words, could the objectives of the subsidy be achieved by other, more cost effective policies? Suggestion: one way of doing this is by comparing the cost of subsidy per unit of product with the cost per unit of an equivalent product. Note this step helps set the stage for the analysis of the impacts of policy reform. While collecting new, detailed information on the cost effectiveness of alternative policies, if not readily at hand, can be time consuming and costly, the analyst should at least consider and describe alternative policies</p>	
<ul style="list-style-type: none"> What alternative policies exist for meeting those objectives? Please describe: 	<p>The main objectives of this policy are the following: increase business productivity; increase businesses revenues; increase labour supply and employment. Social objectives include increasing households income and promoting employment from social groups living in rural areas.</p> <p>Economic objectives:</p> <ol style="list-style-type: none"> 1) On the increase of business productivity, a vast literature is available on relevant policies, including measures that can be used to promote employees productivity. 2) If the objective is to increase revenues, other stimulus packages can be set up which are more focussed to the needs of businesses. Tax exemptions are more cost-effective if tailored to specific social economic goals than granting them across the board. 3) Increasing labour supply seems to be better achieved though measures that promote female participation to the labour market. 4) Company cars can be provided to the extent that they allow employees to be more effective at their job (e.g. for the sales person to get from a to b in a shorter amount of time). A non distortionary system to this aim, would be to tax private use in line with the effective costs of owning a car, as in the US model. In the US, it is common that employers pay an amount of money to employees that can be used to lease a car (the employee is the lessee). The employee is then taxed on this amount of money as wage. When the company car is used for business purposes, the employee will receive from the employer a reimbursement for the marginal costs. This reimbursement is not taxed, in line with recommendations of optimal taxes by economic theory (Katz and Mankiw, 1985). In this way the deadweight welfare loss would be corrected. <p>Social objectives:</p> <ol style="list-style-type: none"> 1) Literature and evidence suggest that employees prefer higher wages to non monetary fringe benefits such as company cars. Non monetary compensation is given at the cost of higher wages. Research proves that the only reason for accepting company cars is the tax advantage and the possibility of getting these at a much lower price than it would otherwise be in the goods market. 2) For the purpose of attracting labour with long commuting distances, relocation benefits (i.e. compensation of moving costs by the employer) are more cost-effective policy for both employers (relocation costs may amount to £8,000 vs the annual cost of providing a car which is €8,700) and to society as a whole (van Ommeren J., van der Vlist A. and Nijkamp P., 2006). Relocation benefits would have to be made more attractive to employees by raising the taxation exemption threshold at least to the average moving costs in the Netherlands (currently this is not the case). <p>The above measures would also ensure the effectiveness of other public policies aimed at reducing congestion, such as the road tax, the aim of which is to reduce commuting by car. This is ultimately an issue of policy coherence.</p>

2.3.2 Incidental Impacts

The analysis of incidental impacts asks what impacts have occurred, or might occur, in areas (environmental/economic/social) not foreseen or targeted in the original subsidy design. The stress here is on long-term, dynamic and international impacts (e.g. this includes any impact of the subsidy on foreign producers – which should be noted in the analysis).

<p>2.1 <i>What are the unintended economic impacts of the subsidy?</i> (e.g. unintended economic impacts such as impacts on the prices of factors of production and intermediate inputs used by non-target industries; or economic impacts of social and environmental changes brought by the subsidy).</p>	<p>Company cars are considered a productive good. Current levels of taxation however make them an attractive alternative to wages for employees and an attractive tax exemption on labour. The provision of company cars has become a perk.</p> <p>Another unintended consequence of the special treatment of company cars is the over consumption of cars for commuting purposes.</p> <p>Historically, company cars were not taxed and treated as a way of de-taxing businesses and keeping wages from growing too quickly, thus keeping inflation at bay. Also following the rule '<i>de minimis non curat lex</i>', governments believed it would have been too costly to regulate this benefit. Because of this initial condition, it has always been difficult to eradicate the entitlement mentality and fighting the preconception that 'if you tax company cars, you tax business'.</p>
<p>2.2 <i>What are the unintended social impacts of the subsidy?</i> (e.g. socially undesirable distributional impacts such as on low-income consumers, on non-target population generally, on developing country exporters). In order to answer this question Barg et al. (OECD, 2007) suggest describing the characteristics of the various social groups.</p> <ul style="list-style-type: none"> • <i>Are there any impacts on social groups in third countries deriving from the existence of the subsidy? If yes, describe them. Are they important?</i> 	<ul style="list-style-type: none"> - The benefits are inequitably distributed, as they accrue to high income professionals. Research conducted by COWI (2004) in Denmark showed that company cars are the most inequitably distributed of all benefits in kind to employees. - Company cars are offered mainly to men (in the Netherlands about one in seven male employees and one in 38 female employees has a company car (Statistics Netherlands, 2003, quoted in G&O, 2009). Compared to other European countries, the Netherlands seems to take an average position in this respect. <p>No.</p>
<p>2.3 <i>What are the unintended environmental impacts of the subsidy?</i> These are mainly linked to primary economic impacts – changes in the levels of inputs and wastes e.g. degradation of ecosystem services; loss of biodiversity, synergistic effects. See also your answer to linkage 3 in the quick scan.</p>	<p>See quick scan, linkage 3. Impacts on the environment were simply not thought of at the time of origin of the subsidy.</p>

<p>2.3.3 Long-Term Effectiveness</p> <p>Too often, a subsidy designed to solve a short term problem may easily become the cause of problems in the longer term. In this section, the analyst needs to ask whether the subsidy is merely treating the symptoms of a larger problem, or whether it actually addresses underlying causes. The assumption is that, if the former is true, the subsidy may in fact be delaying necessary structural change.</p>	
<p>3.1 Is the subsidy designed so as to eventually address the economic underlying</p>	

problems that gave rise to its creation? e.g., by spurring innovation, increasing resource or labour productivity or increasing the supply of a public good?	No.
3.2. Is the subsidy aimed at addressing underlying social problems or to treat symptoms, and therefore perpetuating a social 'lock-in'?	No.
3.3. Is the subsidy designed to directly address the environmental problems (e.g. problems facing infant industries)?	Not relevant.

2.3.4 Policy Reform

This is the final stage in the analytical framework. It involves highlighting the costs and benefits of the various options for reform, including outright elimination of the subsidy, phased elimination, changed policy design, and alternative measures. The analyst will also need to ask what sorts of flanking measures might be considered as a palliative complement to the various reform options.

<p>4.1 What would be the environmental, economic and social impacts of various scenarios for reform of the subsidy, including outright elimination, phased elimination, and change in policy design? Would they differ from a simple reversal of the incidental impacts discussed above?</p>	<p>The advantages of reforming the subsidy via increasing taxation to the optimal levels, would be the elimination of deadweight welfare losses. A model for this would be the system adopted in the US, where employers provide a monetary contribution to employees that can be used to lease a car, the employee is taxed on the perceived monetary contribution as wage. Employees pay for all the costs of leasing a car (including taxes). When the company car is used for business purposes, the employee receives from the employer a reimbursement for the car's marginal costs. This reimbursement is not taxed, in line with recommendations of optimal taxes by economic theory.</p> <p>Other paths for reform include adjusting tax charges to incentivise the greening of the fleet. Arguably however policies aimed at greening passenger cars are more effective when applied to <i>all</i> cars, not just company cars. An assessment of the effectiveness of taxation policy seem desirable. IEEP (2006) suggests that graduated annual circulation taxes might have more impact on company cars than on private cars.</p> <p>One such model is the reform of the company car tax system in the UK, which succeeded in reducing the number of company cars and in reducing the gCO₂/km of newly registered vehicles. In the UK it resulted in the decrease of the average gCO₂/km of cars by 17 gCO₂/km (from 199 to 182). Reform was a reason for no longer providing company cars for around 70% of employers who opted out and for around 60% of employees who chose to give up a company car. Interestingly, the other most commonly cited reasons why employers no longer offer company cars (mainly because employees no longer want them) are that: a) alternative forms of remuneration were considered more attractive; b) employees wanted a different type of car from those the employer was willing to offer as a company car; and c) company cars were no longer considered essential to the needs of the employer's business (HMRC, 2006). It is however important to pre-empt leakage effects to other schemes involving compensation of car travel, see points made under the checklist tool.</p> <p>Measures aimed at discouraging the supply of free fuel by employers are also recommendable. The tax exemption of fuel or a flat rate charge result in very low marginal cost of motoring. In the Netherlands the provision of free fuel is widespread, also for private travel and commuting. A fuel scale charge in the UK was set up, aimed at dis-incentivising the provision of free fuel: the system introduces both a benefit tax calculated on the same basis as the company cars tax (i.e. graduated on gCO₂/km) and employer pays the National Insurance Contribution indexed against the size of the engine and the type of fuel used (standard petrol or diesel). In an evaluation of company car tax reform, HM Revenue and Customs indicates that the amount of private vehicle use has declined in cases where they no longer receive free fuel: the amount of cars receiving free fuel has declined by 600.000 and there has been a reduction of 70-100 million miles driven from 1997-2005 partly as a result of this (DfT, 2006). Similarly, in Sweden, the introduction of a free fuel tax into the taxation as a benefit in kind is reported to have achieved a reduction in the private mileage by 20% (IEEP, ABRL, COWI, 2006).</p>
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	<p>Commuting by car should be considered as private mileage, other travel modes should be encouraged and the contribution to relocation costs should be made an attractive alternative.</p> <p>A reform can be planned on a cycle of 3 to 4 years, updated, on the basis of a company car use for business.</p> <p>Some examples of negative consequences of reforming the system, have been found in relation to the company car tax reform in the UK, where the following negative impacts occurred:</p> <ul style="list-style-type: none"> - A substantial increase in company cars running on diesel, with consequences on the levels of PM and NO₂. It is considered that a higher tax rate surcharge for diesel cars (currently +3%) could have prevented this shift. - A reduction on income tax rates charged on clean vehicles can lead to lost revenue (HMRC, 2006). This happened in the UK, partly because the discounts on low-CO₂ cars were too large (10% - 15% rate), so much to cause a big shift to cleaner cars and loss of revenue. Also, at the top end of the tax rate, there has been a phenomenon of leakage to other systems (such as the use of a private car for business use) with preferential tax treatment. They failed to foresee either of these things for some reason, but they could to an extent be avoided and then the cost would be lower. Also reductions in company car registrations have an impact on social contributions, as the reduction in company cars reduced the taxes flow from the fringe benefit taxation. These were not sufficiently off-set by the extra income tax and national insurance contributions (NICs) collected on the extra pay given to employees as a benefit in place of a company car (HMRC, 2006) - Risk of leakage to other environmentally unfriendly schemes: in the UK, while in the first two years following the reform the number of company cars fell by 250,000 (IR, 2004), there has been an increase in personal leasing, employee car ownership schemes, allowance mileage payments and employers switching from purchasing vehicles taxed under company car tax to those taxed under company van rules (IR, 2004). The implications are that employers and employees switch to schemes that enjoy of a more favourable tax treatment, therefore purchasing and driving vehicles which would otherwise be subject to high charges under the company car tax scheme. Drivers in the UK who no longer receive a company car tend to choose private cars with higher CO₂ emissions figures by an average of 5g/km (HMRC, 2006). This leakage is thought to have effectively diluted the positive environmental impact of the tax reform. In order to prevent this these other taxation systems should mirror the company car taxation scheme and introduce CO₂ bands rates. - Evidence suggests that small enterprise might need some specific measures. These companies are unlikely to recur to company cars via leasing, due to the level of risk involved in being bound to three years contract with leasing companies. When opting to ownership however they tend to choose cars with lower depreciation levels, which are often the most polluting cars. <p>One should also be aware of the linkage that exists between the market for company cars and the market for private cars. The company car fleet is relatively new, and many company cars are sold after a few years on the second hand market. To a certain extent, therefore, the composition of the private car market reflects the company car market with some delay. Through this linkage, a decrease in company cars due to subsidy reform would also have repercussions for the composition of the total car stock over time. Whether the overall impact is positive or negative requires a detailed analysis beyond the scope of the present study.</p>
<p>4.2 Where negative impacts are predicted, what sorts of flanking measures might be helpful in addressing the negative impacts? Conditions necessary</p>	<p>Some examples of possible flanking measures to reduce negative impacts of the tax reform:</p> <ul style="list-style-type: none"> - In any case there is a need to ensure that reform does not happen in isolation and adequate policies are set up across the board encouraging emission reduction for all passenger cars. - Policies to reduce the level of PM and NO₂, including incentives for the use of

for successful transition have been analysed by Cox A. in OECD 2007, also some examples of compensation have been included in IEEP et al. (2007)	<p>particle matter filters (currently provided in the Netherlands) and road pricing are arguably the most cost-effective policy to reduce possible increases in emissions due to a higher share of diesel cars (Smeets W. et al., 2006).</p> <ul style="list-style-type: none"> - The removal of distortionary taxation of company cars will increase the effectiveness of traffic management policies such as road pricing. - Reduction of the tax rates on the purchase and circulation of cleaner cars.
4.3 What would be the impacts of subsidy reform on trade?	No specific evidence found.

Summary of the application of the integrated assessment to the case study	
1. Is the subsidy <u>currently</u> justified by any relevant market failure.	The subsidy is not justified by a current market failure.
2. If yes, is there an alternative way to tackle that market failure?	Not relevant.
3. Is the subsidy <u>currently</u> justified by any strong social concern?	The subsidy is not currently justified by a strong social concern.
4. If yes, is there an alternative way to tackle that social concern?	Enhancing revenues and labour supply for business can be increased by ensuring better access to the market to female labour and by recurring to other benefits, such as relocating benefits.
5. Have there already been attempts to remove this subsidy, and if yes, why they failed? <i>(eg opposition by vested interests, public perception concerns, lack of political will given negotiating capital)</i>	<p>In the Netherlands from time to time there is a discussion about the fiscal treatment of company cars, and the fact that company car users hardly have any incentive to drive less, since they only pay a fixed amount of taxes and often a fixed contribution to their employers. There is often confusion about the fiscal treatment of company cars compared to privately owned cars that are also used for commuting and business trips. VROM has evidence, however, that on average, company cars pay less taxes.</p> <p>In 2004 the fiscal system for company cars was changed. There used to be a differentiation of the percentage for the fiscal addition, depending on the number of kilometres travelled for private purposes. In this way, there would be an incentive to make less private trips with the company car. In 2004 this differentiation was abolished and a uniform percentage of 22% was established (with the exemption of < 500 privately driven kms), mainly because of the administrative burden of the rules. There also have been important changes in the rules for reimbursement of travel expenses by employees using their privately owned cars. More recently, in 2008 the level of taxation was raised to 25%, while an environmental differentiation was introduced on the basis of CO₂ emissions.</p> <p>A removal of the subsidy in the sense of increasing the taxed percentage of the company car value from the present 25% to the 'optimal' level (51%, according to G&O) has not (yet) been proposed.</p>
6. Could you make recommendations on possible compensation measures that could be used to palliate impact of removal?	<p>The subsidised industry is very broad: it includes small and medium enterprises and big corporate companies, across the services and industry sectors, it is therefore impossible to generalise the possible compensation measures. Compensation to business for reforming this subsidy does not seem to be necessary, although the impacts on small business should be assessed.</p> <p>Possible compensation measures to employees who opt out of company cars include</p>

	<p>offering alternative forms of remuneration, these are typically:</p> <ul style="list-style-type: none"> - cash; - other non-cash benefits (e.g. private medical insurance, childcare vouchers, extra holiday entitlement) - relocation benefits for those who are commuting long distances (there is scope in the Netherlands to reform the taxation of these benefits to make them more attractive).
<p>7. What would be the impacts on trade of the subsidy removal? Will it have any global environmental impacts?</p>	<p>Not relevant.</p>