FACT SHEET NO.: 6 / 4 **PERFORMED BY: PRO**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Urban mobility - management & monitoring (freight / passengers, microlevel applications/implementations)**
A 3	**Transport policy measure (TPM)**	**Promotion of energy efficiency commercial vehicles (delivery vans, taxis, buses…)**
A 4	**Description of TPM**	This TPM aims to promote the use of energy efficient commercial vehicles in the European Union. In order to enlarge the market share of energy efficient commercial vehicles there is a need to provide support for Member States through facilitating and structuring the exchange of knowledge and best practices for promoting the purchase of clean and energy-efficient commercial vehicles. Energy efficient commercial vehicles can be defined as vehicles with a significant degree of energy transformation, often capable of using electricity (also hybrids), hydrogen, biogas and liquid biofuels in high blends. To promote the usage of energy efficient commercial vehicles it is necessary to take environmental impacts of vehicles over their whole lifetime (cradle to grave) into account by influencing the purchase decisions for public transport (buses) and commercial vehicles (LCV - light commercial vehicles, HCV - heavy commercial vehicles). These lifetime impacts of vehicles include energy consumption, carbon dioxide emissions and emissions of the regulated pollutants of NOx and PM. For public transport (buses) the EU aims to include lifetime costs for energy consumption, CO_2 emissions and pollutant emissions as a award criteria in the procurement of vehicles for public transport services. This way energy efficient buses will become more attractive for (local) authorities. It is important to mention that this TPM is not aiming to shift freight from short-sea shipping, rail and inland waterways to road transport.
A 5	**Implementation examples**	- Clean Vehicle Europe: "The Clean Vehicle Portal is a new web-database which aims to ensure a level of demand for clean and energy-efficient road transport vehicles and encourage manufacturers to invest in development of vehicles (also buses, LCV, HCV) with low energy consumption, low CO_2 emissions and pollutant emissions" (www.cleanvehicle.eu). - Energy in transport (STEER - Sustainable Energy use in Transport) is designed by the EU to promote energy efficiency and the use of new and renewable energy sources in transport. - The CIVITAS Initiative (City-Vitality-Sustainability) has been launched by the EU to support cities to introduce ambitious transport measures and policies towards sustainable urban mobility (including the stimulation of clean and energy-efficient public and private vehicles for passenger and freight transport). Several implementation examples (EU cities stimulating energy efficient transport) can be found on the website: www.civitas-initiative.org. - The EU Regulation (510/2011) demands that the average new LCV sold in the EU in 2017 will be required to emit 175g CO2/km or less and 147g CO2/km or less by 2020. [5]
A 6	**Objectives of TPM**	Direct objective: Broad market introduction of energy efficient vehicles is often hampered by high initial costs for vehicles and thus insufficient customer demand. By stimulating the market for energy efficient vehicles, the EU aims to create markets of sufficient size to cut production costs of vehicles with better environmental performance. [1] [2] Furthermore, the stimulation of the market for energy efficient vehicles aims to contribute to the EU objectives (Clean Transport Systems (CTS) Initiative) of increasing energy efficiency in the transport sector and protecting the environment by reducing emissions of carbon dioxide and air pollution from vehicles [1] [2].
A 7	**Key changes concerning:**	
A 7.1	- Choice of transport mode / Multimodality:	No key changes, more sustainable public transport (buses) will probably not lead to a change in modal split. Besides, it is not the objective of this TPM to generate a modal shift. This TPM only aims to increase the current and future vehicle stocks (buses, LCV, HCV) energy efficiency. [7]
A 7.2	- Origin and/or destination of trip:	No key changes
A 7.3	- Trip frequency:	No key changes
A 7.4	- Choice of route:	No key changes
A 7.5	- Timing (day, hour):	No key changes
A 7.6	- Occupancy rate / Loading factor:	No key changes
A 7.7	- Energy efficiency / Energy usage:	Energy efficient commercial vehicles will lead to a decreasing demand for resources (mainly oil), caused by the shift to sustainable combustion engines (hybrids, electric, biofuel, etc.) and more efficient conventional engines (petrol and diesel). To achieve a significant reduction of the use of non-renewable resources (like oil) it is crucial to use of renewable sources (solar, wind, biomass, etc.) to power commercial vehicles [10]. Quantification of some technical changes to HCVs will have the potential to increase energy efficieny of commercial vehicles. A few examples are: - Aerodynamic changes to HCV can reduce fuel consumption up to 5 %. [13] - Reducing rolling resistance (= rolling friction or rolling drag) of HCVs can save 3 % fuel consumption. [13] - Reducing the weight of HCVs (for instance by using different building materials like alluminium) will save up to 5 % fuel consumption. [13]
A 8	**Main source**	[2]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 1.1	**Summary**																	N	L	S	I
		- Promoting the usage of energy efficient vehicles (and thus sustainable behaviour) will only be succesful if transport operators (public transport companies and road freight companies) will acknowledge the policy objective. History has proven that promoting sustainable behaviour (for instance vehicle labelling) is very challenging. [3] - Public bodies will have to support the whole product development and innovation chain from research to market introduction in a more integrated approach on creating more energy efficient commercial vehicles. This will require additional investments from public bodies. [9] - Without support from public bodies producing energy efficient commercial vehicles will continue to have a higher price for producers and consumers. - A life cycle approach (costs and benefits of commercial vehicles during their lifetime) is needed to promote the attractiveness of energy efficient commercial vehicles. - Promoting energy efficient commerical vehicles will not have major impacts on traffic. A minor rise in vehicle mileage is foreseen because of reduced environmental impacts which removes boundries for new infrastructure investments in urban areas. - Environmental benefits of increasing energy efficient vehicles will only be meaningful if (semi) electric vehicles will be using power from renewable energy. Electric cars driving on electricity generated by coal power plants will even produce more greenhouse gases during their lifetime than conventional diesel engines. [10] Potentially (if above mentioned conditions and considerations will be taken into account), the promotion of energy efficient commercial vehicles will have a positive effect on road users (including slow modes), transport operators, residents in urban areas and society (especially children and people with reduced lung function). These groups will mainly benefit from the reduced energy consumption (less resources needed). Furtermore, energy efficient commercial vehicles (as defined in the description) will cause less air pollutants (especially in urban areas), and reduce CO2, NOx and PM emissions. [1] [2] [4]																		
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**	- Air pollutants (mainly PM) lead to increased use of medication by people with asthma, and reduced lung function [6]. - A high exposure to transport-related air pollution is associated with increased prevalence of bronchitis in children [8]. These groups will benefit substantially when commercial vehicles will become more energy efficient and produce less air pollutants. Especially those living in urban areas and near busy motorways.																			
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	→			→		→					→						N	L	S	I
B 2.4	Service and comfort	↗			↗	↗												L	R	E	
B 2.I	**Overall impacts on social groups**																				
B 2.II	**Implementation phase**																				
B 2.III	**Operation phase**																				
B 2.IV	**Summary / comments concerning the main impacts**	- The promotion of energy efficient commercial vehicles is meant to enable growth of public and commercial transport (trucks) without further harming the environment. Enabling growth does not mean that vehicle mileage increases more due to this TPM. This TPM "only" allows the already expected growth [1] [2]. - An increase of the level of comfort, due to cleaner (less air pollutants) commercial transport, will increase for all road traffic participants (including slow modes).																			
B 2.V	**Quantification of impacts**																				

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	➔				➔	➔					➔						N		S	I
B 3.2	Private income / commercial turn over																↗	N		E	
B 3.3	Revenues in the transport sector						➔					➔						N		S	I
B 3.4	Sectoral competitiveness						↗					↗						R		E	
B 3.5	Spatial competitiveness															↗		I	N	S	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs													↘			↘	L	N	S	I
B 3.9	Public authorities & adm. burdens on businesses															↗		N	I	S	I
B 3.10	Public income (e.g.: taxes, charges)															↘		N		E	
B 3.11	Third countries and international relations																				
B 3.I	**Overall impacts on social groups**																				
B 3.II	**Implementation phase**	- Clean and energy-efficient commercial vehicles initially have a higher price than conventional ones (petrol or diesel combustion. [2]																			
B 3.III	**Operation phase**	- Operational lifetime costs of a vehicle (including energy consumption, CO_2 emissions, and pollutant emissions) will decrease through the use of energy efficient commercial vehicles. [2]																			
B 3.IV	**Summary / comments concerning the main impacts**	- A cost-benefit analysis, weighting possible higher investment costs for commercial vehicles up-front against the saving from lower energy consumption and CO_2 and pollutant emissions, shows potentially large economic gains (mainly gains because of fuel savings) for operators as well as for society. Still, these savings will require additional investments during implementation phase. [2] - The purchase of clean and energy-efficient vehicles for public transport (buses) offers an opportunity to cities wishing to brand themselves as environmentally conscious. This increases the spatial competitiveness between European cities. [2] - An increasing demand for energy efficient commercial vehicles will enable producers to expand their production which leads to lower production costs. - Health service costs for society and especially residents in urban areas will decrease by reduced air pollutants (result of energy efficient commercial vehicles). [6] - The specific (CO_2) emissions from commercial vehicles will have to be measured on a harmonised basis in the Union according to the methodology laid down in Regulation (EC) No 715/2007. This will lead to more administrative burdens for the Member States who are responsible for applying the new rules and standards. [5] - Innovation will be a key factor for maintaining the competitiveness of the automotive sector and increasing the energy efficiency of commercial vehicles. Public funding will have to support the whole product development and innovation chain from research to market introduction in a more integrated approach on creating more energy efficient commercial vehicles. [9] 3 level impacts: - Energy efficient vehicles will require less fuel. This will lead to reduced public income for public bodies because they receive excise tax on petrol. - European vehicle manufacturers sectoral competitiveness will increase compared to non-european vehicle manufacturer, because on the long run, energy effiecient vehicles will become more attractive due to increasing energy costs. - The demand for non-renewable resources will decrease due to higher efficiency. Hence, the energy prices will not increase as much as without energy efficient vehicle promotion and thus transport costs for all users will decrease and private income / commercial turnover increases.																			
B 3.V	**Quantification of impacts**	Heavy commercial vehicles (HCV) are a major problem to air quality. For instance an average diesel truck produces 50–100 times more fine and ultra-fine particles (PM) per km travelled than a passenger car. [6]																			

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	N	S	I
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗					N	I	S	I
B 4.8	Cultural heritage / culture																				
B 4.I	**Overall impacts on social groups**																				
B 4.II	**Implementation phase**	- A rising demand for energy efficient commercial vehicles will lead to more employment during the take off phase (a phase with a rapidly increasing demand for energy efficient vehicles). [9] [12]																			
B 4.III	**Operation phase**	- The additional demand for employment in transport during implementation phase will hamper after a few years and employment rates will decline to current levels.																			
B 4.IV	**Summary / comments concerning the main impacts**	- Well-being of residents (mainly in urban areas and near busy motorways) and society increases when commercial vehicles become more energy efficient and produce less air pollutants, CO_2, Nox and PM emissions. [4] - Employment in transport will benefit a few years from the higher demand for energy efficient vehicles. Importantly, new skill profiles (for workers in the transport industry) are required, because current production capacities will have to be adapted, new production methods devised, further sources of raw materials secured and new clusters and business models developed. [9]																			
B 4.V	**Quantification of impacts**	- A 10-µg/m3 increase in traffic-related PM will lead to a 3.4% increase in mortality [8]. - In Germany, calculations forecast 30.000 new jobs (in the automotive industry) by 2020 if the government promotes the development of electric vehicles. [12]																			

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	L	N	S	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	N	I	S	I
B 5.6	Renewable or non-renewable resources																↓	N	I	S / EE	I
B 5.I	**Overall impacts on social groups**																				
B 5.II	**Implementation phase**																				
B 5.III	**Operation phase**																				
B 5.IV	**Summary / comments concerning the main impacts**	- Energy efficient commercial vehicles will lead to reduced fuel energy consumption (less resources needed). Furthermore, energy efficient commercial vehicles (as defined in the description) will cause less air pollutants (especially in urban areas) by reducing CO2, NOx and PM emissions. [1] [2] [4] [EE] - The effect on noise emissions is uncertain. This depends on the kind of energy efficient vehicles used and the growth of vehicles mileage (within urban areas). **Importance of life cycle effects:** Several studies have shown that life cycle acidification rates (amount of greenhouse gases produced by vehicles over their life cycle) of PHEVs (Plug-in Hybrid Electric Vehicles) and BEVs (Battery Electric Vehicles) are only significantly lower (compared to conventional petrol cars) if the power necessary for driving(semi) electric vehicles is produced by renewable energy systems (solar, wind, etc.). From an environmental point of view, it is necessary that the market penetration of energy efficient vehicles (BEVs, PHEVs) is based on the use of renewable sources [10]. Unfortunately this research mainly focuses on passenger cars the findings are expected to be reasonable for LCV and HCV. Still, similar results can be expected for commercial vehicles. - 3rd level impact: The demand for non-renewable resources will decrease due to higher efficiency. Hence, the energy prices will not increase as much as without energy efficient vehicle promotion.																			
B 5.V	**Quantification of impacts**	- Heavy-Duty Vehicles (HDV) represent about a quarter of EU road transport CO_2 emissions and some 6% of the total EU emissions. [11]																			

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References**	**International** [1] European Commission (2007): Sustainable economics with clean and energy efficient vehicles, Memo/07/594, Brussels [2] European Commission (2009): Directive 2009/33/EC, On the promotion of clean and energy-efficient road transport vehicles, Brussels [4] European Commission (2011): Commission Staff Working document . Accompanying the White Paper - Roadmap to a single European transport area. SEC(2011)391. Brussels [5] European Commission (2011): Regulation No 510/2011, Setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO 2 emissions from light-duty vehicles, Brussels [6] World Health Organization (2000): Transport, Environment and Health, Copenhagen: WHO Regional Publications, European Series, No. 89 [7] European Commission (2012): Call for proposals 2012 for actions under the programme "Intelligent energy - Europe", Brussels [8] World Health Organizazion (2005): Studies on health effects of transport-related air pollution, Copenhagen: Publications WHO Regional Office for Europe [9] European Commission (2012): CARS 21 High Level Group - On the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, Brussels [13] Shell (2011): Shell Lkw-Studie - Fakten, Trends und Perspektiven im Straßengüterverkehr bis 2030, Hamburg: Shell Deutschland Oil GmbH (in german) **National** [3] Gärtner, A. (2005): Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars, München: ADAC e.V. [10] Helms, H., et al. (2010): Electric vehicle and plug-in hybrid energy efficiency and life cycle emissions, Heidelberg: Ifeu – Institut für Energie- und Umweltforschung [11] Borken-Kleefeld, J., Ntziachristos, L. (2012): The potential for further controls of emissions from mobile sources in Europe, Laxenburg: International Institute for Applied Systems Analysis (IIASA) [12] Nationale Plattform Elektromobilität (2011): Zweiter Bericht der Nationalen Plattform Elektromobilität, Bonn: Bundesministerium für Verkehr, Bau und Stadtentwicklung (in german)