Clean **Ve**hicle **R**esearch: LCA and Policy Measures
(CLEVER)

Preparatory Document for

Stakeholder Meetings (Task 5.2)

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1. Introduction

CLEVER (Clean Vehicle Research) is a research project sponsored by the Belgian Science Policy which aims at promoting the purchase and use of clean vehicles in a Belgian context. In this project, an overall assessment will be carried out on the basis of the results of several assessments:

- A life cycle assessment will allow quantifying the environmental impacts of different vehicles types from cradle-to-grave.
- A life cycle cost assessment will determine the cost per kilometre for the life cycle of the car and will include the purchase price, estimated salvage value, fuel costs, insurance costs, costs of technical control, maintenance costs, battery costs and taxes.
- The social barriers and the fleet analysis will reveal the obstacles confronting new vehicle technologies and limiting the purchase and/or use of clean vehicles.
- The influence of fiscal and other policy measures will be assessed in order to investigate possible policies towards a more sustainable car choice.

In order to assess possible policy measures to promote a more sustainable car choice it is important to gain insight in possible measures and their impact. The report of WP1.3 'Overview of policy measures', gives an overview of relevant policy measures implemented in different countries. Important in the analysis of the different policy measures or instruments were which definition of 'cleaner vehicles' is used and what the impact of the instrument is on the purchase or use of cleaner vehicles. The analysis was based on reviewing literature and other resources, a first start was the literature review on policy measures undertaken in the ecoscore-project on behalf of the Flemish Government (Govaerts et al., 2005).

The analysis was used for the development of policy pathways in Belgium for the promotion of cleaner vehicles. **This report gives an overview of policy measures that were withheld to form these policy pathways. In following tasks, these strategies will be discussed by different stakeholders and will lead to policy recommendations.** Several stakeholder meetings will be organized, with stakeholders from the supply side, with consumers, experts, environmental groups, motorist clubs and policy makers.

2. Specific objectives of the stakeholder meetings

- Discuss the definition of clean vehicles
- Discuss feasibility and effectiveness of policy pathways in Belgium
- Prioritize policy measures and pathways in Belgium

3. Barriers to the introduction of clean vehicles

In task 4.2 of the CLEVER-project, **barriers to the introduction of clean vehicles are to be identified and evaluated** by inquiring of private users, public and private fleet owners, suppliers and experts. **Policy measures should be able to lower this barriers** in order to ease the distribution and the use of clean vehicles. Therefore these measures should be very clear, purposeful and consistent.
In the following paragraphs, only preliminary results are shown. Further research will provide more insight.

3.1. Private users

The reasons given by private users as to not buying cleaner cars, are:

- higher purchase price and lack of financial incentives;
- problems with the supply side and competition with fuel-efficient conventional cars and the low diesel price;
- a lack of information and knowledge (which causes also fear for new technologies and fuels like LPG, CNG, hydrogen…);
- a lack of conviction about environmental advantages for the "true" ecologist.

3.2. Public and private fleet owners

Barriers mentioned by these stakeholders are:

- short supply (not legal if too restricted on the public market) or no appropriate vehicles available (police cars, ambulance…);
- some bad experiences with electric or LPG-vehicles;
- a lack of information;
- small budget.

3.3. Supply side

The main reasons why suppliers are hesitating to introduce environmentally friendly cars are:

- no will to invest in future technology because of uncertainty about demand, future technological developments and future political measures;
- no fuel distribution ("chicken and egg"-problem);
- lack of political measures.

3.4. Experts

The reasons identified by experts for the slow distribution of alternatively fuelled cars are:

- the "lock-in" of fossil fuels (no incentives for alternative fuels);
- the lack of political measures for encouraging clean vehicles;
- the inappropriate tax system (with prices of diesel that are too low);
- a lack of coordination between private and public stakeholders that lead to "uncompleted" products.

4. Definition of clean vehicles

An important part of the analysis of the different policy measures in the Report 'Overview of policy measures', was the definition that was used to define a clean vehicle. **Deciding on the definition is deciding which type of vehicles are to be stimulated by means of the implemented measure.** The different definitions that are listed in the Report, are:

- technology based (e.g. vehicles designed to use alternative fuels, equipped with a particulate filter, etc.);
- CO_2-emission based (e.g. vehicles with a CO_2-emission of less than 105 g/km)
- emission standard based (e.g. euro 4-vehicles);
- ecoscore of the vehicle (e.g. ecoscore > 65);
- a combination of the above.

This is **the first topic that will be discussed during the stakeholder meetings**, and can possibly be of importance when discussing certain policy measures.

5. Policy pathways

One of the conclusions of the Report 'Overview of policy measures', was that **a mix of policies which integrates carrots (incentives), sticks (disincentives) and regulations, has the largest effec**t. This includes a mix of target audiences: steer industry and final consumers, both public and private. Therefore, different policy measures that have proven to be effective will be proposed to the different stakeholders, resulting in policy pathways that consist of a mix of measures. The following measures were withheld to form these policy pathways, and will be presented and discussed during the stakeholder meetings.

- Green car taxation
- Road pricing: kilometre charge and congestion charge
- Subsidies
- Green public fleets
- Availability of clean vehicles and fuels
- User (dis)advantages (parking and restricted zones)

These measures will be discussed briefly in the following paragraphs.

5.1. Green car taxation

Car taxation can be divided into 3 types: acquisition taxes paid with the purchase or registration of a car; ownership taxes which are paid annually like circulation taxes and taxes related to the use of a car, namely fuel taxes (excise duties), and road taxes. This paragraph only deals with the first two types of taxes, which can be critical instruments to achieve the EC's target of 120/130 g CO_2/km by 2012/2015.

5.1.1. Registration tax

Since the registration tax is due at the very beginning of procurement/ownership of a car, this can be considered a good instrument **to steer the purchase decision towards a clean vehicle**.

Issues to be discussed:
- lowest rate (Belgium, 2008: € 61,5)
- highest rate (Belgium, 2008: € 4.957)
- reduction for older vehicles
- …

Examples:
- The Netherlands: reduction or increase depending on relative fuel efficiency and additional "slurp-tax" for vehicles with high CO_2-emission (extra of 110 €/g CO_2 above a certain threshold)
- France: bonus for vehicle with CO_2-emission less than 130 g/km, malus if more than 160 g/km.

5.1.2. Circulation tax

Since the circulation tax is a yearly tax, this can be considered to be a good instrument **to stimulate the replacement of existing vehicles**.

Issues to be discussed:
- lowest rate (Belgium, 2008: € 66,53)
- highest rate (Belgium, 2008: € 3.557,93)
- …

Examples:
- Germany: circulation tax based on cylinder capacity, emission standard and the presence/absence of a particulate filter.
- UK: tax based on CO_2-emissions (differentiation is too small to have an impact on purchase behaviour, min – max: £ 0 - £ 400)

5.2. Road pricing

This section covers a type of pricing mechanism **to encourage reductions in vehicle travel and shifts to other modes of travel**: road pricing. Distance and/or time based pricing and cordon based charges are the most common types of road pricing. These measures change the variable cost of driving either per kilometer, per time of day or per trip. The variable cost is in this case expressed as roadway usage fees that amount to a toll for either each unit of distance travelled, or entry into a specific area.
The purchase cost of a vehicle, which is a fixed cost, represents a high percentage of the costs associated with owning and operating a vehicle. Such fixed costs are not likely to enter into the decision about whether to take a particular trip. By shifting some of these fixed costs to variable, paid each time the car is used, a signal could be sent to drivers regarding the real costs of each trip. This in turn may encourage reductions in vehicle use and shifts to car pools, and to other modes of transportation. If pricing is implemented for travel on specific routes, at specific times, it may reduce vehicle travel in a very targeted manner, with some drivers choosing simply to switch the route or time of particular trips. Such a targeted approach may be very useful for reducing congestion and eliminating traffic bottlenecks. Moreover, when benefits are given to drivers of clean vehicles, e.g. lower tolls, a higher share of clean vehicles using the route or entering the city may be expected.

5.2.1. Kilometer charge

In a typical 'kilometer charge' scheme, a driver pays per driven kilometer. **The price per kilometer can be differentiated on the type of road (e.g. city roads, highways…), the time of the trip (e.g. during peak hours or not) and the environmental performance of the vehicle.** A tracker is installed on every vehicle in order to monitor the position of the vehicle to define the type of road, and the time of the trip. This information is then

sent to the back-office by means of e.g. GPRS. The back-office then calculates the charge that has to be paid, according to the environmental performance of the vehicle.

Issues to be discussed:
- differentiation parameters (time of day, type of road, environmental performance…)
- lowest rate
- highest rate
- inclusion/exclusion/decrease of excise duties on fuel
- reduction for older vehicles
- …

Calculation example:

Passenger car, 120.000 km over 8 years. Current total taxes (exclusion of excise duties):
- lowest rate: € 61,50 + 8 * € 66,53 = € 593,74 → average of 0,005 €/km
- highest rate: € 4.957 + 8 * € 3.557,93 = € 33.420 → average of 0,280 €/km

Examples:
- German Motorway Toll (for heavy duty vehicles): based on emission standard, number of axles and kilometers driven. Registered with On-Board-Unit and GPS/GSM-technology. Applicable only on highway and some secondary roads.
- Switzerland: kilometer charge for heavy duty vehicles replaces annual road taxes. Based on distance travelled, maximum weight and emission standard. Applicable on every road.

5.2.2. Congestion charge

This is a road pricing scheme that is limited to a geographical area, typically a city centre. The price could be differentiated on the time entering the area (e.g. peak hours vs. off peak) and the environmental performance of the vehicle.
In the London and Stockholm Congestion Charge, the system is enforced by means of license plate recognition systems. The license plates of vehicles entering the area is being monitored by means of camera's, and this information is sent to the back-office. The back-office then calculates the charge that has to be paid, according to the environmental performance of the vehicle.

Issues to be discussed:
- differentiation parameters (time of day, environmental performance…)
- lowest rate
- highest rate
- reduction for older vehicles
- …

Examples:

- London Congestion Charging Zone: a daily charge of £ 8 to be paid when entering the Central or Western Extension Zone, from 7 am to 6 pm. Reduction of 90% for residents and exemption for taxis, motorcycles, clean vehicles (electric, hybrid, LPG, CNG…). Proposal to increase the daily charge for vehicles with CO_2-emission > 225 g/km (£ 25) and exemption for vehicles emitting less than 120 g CO_2/km.
- Stockholm: charge per passage depending on period (from € 0 to € 2,20, with a maximum of € 6,60 per day). Buses, taxis, motorcycles, clean vehicles (electric, fuel with alcohol-mix)… are exempt.

5.3. Subsidies

Subsidies are all kind of direct financial incentives given at the moment of purchase of a car or retrofitting the car which can not be qualified as fiscal incentives. European subsidy regulations are quite complicated and there is a clear shift from subsidies towards fiscal incentives for cleaner vehicles.

Subsidies can be a good instrument to compensate the social consequences of measures targeting polluting vehicles. Older and thus more polluting vehicles tend to belong to socially weaker classes, which would be targeted disproportionately. Subsidies for achieving less polluting vehicles, eventually coupled with the income, can form (part of) the solution.

5.4. Green public fleets

Mandatory or voluntary fleet quota for public fleets are expected to result over the long term in a general improvement in the environmental performance of the whole fleet through economies of scale, lower costs and wider deployment of enhanced environmentally friendly vehicle technologies. In other words, **fleet quota for clean vehicles create an ensured market for clean vehicles**, from which other (private) consumers can benefit on a later stage: price of clean vehicles decrease through economies of scale, fuelling infrastructure is developed, etc.

Examples:

- The European Commission published a proposal for a mandatory quota of 25 % of "Enhanced Environmentally Friendly Vehicles" (EEV) in public fleets (EC, 2005c), in a first stage limited to vehicles above 3,5 ton weight. This would represent a 10 % share of the total heavy duty market. Later on, this could be extended to light duty vehicles also. This proposal is now being finalised, and would be based on life time costs, including external costs of polluting emissions.
- Flanders: voluntary agreements with local authorities (cities, municipalities and provinces) to introduce cleaner vehicles in their fleet for which they can receive a subsidy, based on the ecoscore. In addition there is a proposal for mandatory criteria

for the environmental performance of new passenger cars purchased by Flemish government and linked institutes, also based on the ecoscore.

5.5. Availability of clean vehicles and fuels

5.5.1. Clean vehicles

An important measure to promote the introduction of cleaner vehicles is **to stimulate the car industry to bring the cleanest vehicles on the market**, which can happen voluntary or mandatory. Important examples of this measure are the voluntary agreements or standards that exist world wide on fuel economy and CO_2-emmissions of light duty vehicles. In such a system, credits are sometimes given for the production of vehicles running on alternative fuels.

5.5.2. Clean fuels

Some car manufacturers offer certain environmentally friendly vehicles running on alternative fuels within their product range. However, these **alternative fuels are not always readily available on the market**, which severely limits the sale of these vehicles. This can have several reasons:

- fuelling infrastructure for these fuels is not available in regular fuelling facilities;
- the price of the fuel at the pump is too high;
- no regulatory framework is available for the fuel (official standard, legal requirements for refuelling infrastructure, etc).

These issues can be resolved by some policy measures:

- regulating the availability of the fuel by creating incentives for the fuel distribution sector;
- regulating the availability of the fuel by mandating the fuel distribution sector to offer a certain amount of alternative fuels at their refuelling stations (e.g. Sweden);
- creating incentives to the users of these fuels, often exemption from excise duty (e.g. bio-ethanol in France, Germany, etc.);
- standardizing the fuel, e.g. by adopting an international agreement (e.g. bio-ethanol);
- facilitating the expansion of the refuelling infrastructure (eg. CNG)

Also to be discussed is the difference in excise duty on petrol and diesel fuel, in favour of the latter, which is less environmentally friendly (more CO_2 per liter than petrol, causes emission of NOx and particulate matter)

5.6. User (dis)advantages

Local authorities can put into action a set of initiatives with the aim of promoting clean means of transport and a more sustainable environment. These initiatives are, due to their local applicability, often defined as user (dis)advantages. **User advantages can aim at offering benefits to consumers who drive environmentally friendly vehicles.** In general, the benefits are of financial nature. A common example of this type of measure is reduced parking fees for clean vehicles. On the other hand, user disadvantages have the purpose to discourage the use of environmentally unfriendly vehicles. This can be obtained by e.g. prohibiting the entrance to a certain area and/or at a certain time, generally city centres, of vehicles not corresponding to a minimum emission standard.

5.6.1. Parking fees

Parking policies can be designed to target certain groups or types of vehicles. An approach that is starting to become more and more prevalent, is differentiating parking fees on the basis of the environmental performance of vehicles. By doing so, cities and municipalities can contribute to improving the local air quality and the environment in general.

5.6.2. Environmental zones

An environmental zone, also called a restricted area, can be considered as an area where a selective admittance policy for vehicles is imposed in order to increase liveability. Restricted areas are often implemented to increase air quality, reduce noise and decrease congestion. The environmental zones that are implemented in Europe are measures to ensure that cities will comply with the future air quality standards set by the European Union. Access can be limited based on the environmental performance of the vehicles. This kind of measure is focused rather on reducing pollutant emissions (particulate matter, NOx, …) and not so much on reducing CO_2-emissions, since this does not affect air quality.

Example:

- Germany: limited access to certain urban areas depending on the particulate matter emissions (recognizable through the colour of a sticker).