

Feasibility Statement

for the development of a methodology to evaluate

Environmentally Friendly Vehicles (EFV)

1. STATUS OF THIS DOCUMENT

The EFV informal group was mandated by WP.29 and GRPE to generate a Feasibility Statement for the development of a methodology to evaluate Environmentally Friendly Vehicles (EFV concept). The informal group met 4 times from June 2008 until April 2009. Documentation can be found on UN-ECE website:

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29grpe/efv04.html>

This document contains basically the executive summary of the main output of the work of the EFV informal group, the background document regarding the feasibility statement of an EFV concept (informal document GRPE-58-02).

At this stage of the EFV project (feasibility study) the scope was limited to passenger cars (vehicles of category 1-1 / Special Resolution No. 1).

2. BACKGROUND

Tackling climate change and improving energy efficiency are two of the major challenges currently facing transport policymakers around the world. In this context, the development and introduction of EFV's as well as renewable fuels are the main fields of action. This issue concerns us all: the government, the industry, the research community and the consumers. Nobody can and must shirk from the responsibility for protecting health and tackling climate change especially with regard to safeguarding the life support systems for future generations.

The presentations and discussions at the 3rd EFV Conference in Dresden as well as at previous Conferences in Tokyo (2003) and Birmingham (2005) as well as in WP.29 have shown that we can only jointly meet the current challenges. In an integrated approach, all road transport players have to be involved in the reduction of CO₂ and pollutant emissions and where possible a technical neutral approach should be followed. Increasing the use of environmentally friendly and sustainable alternative energy sources like for example advanced biofuels (biodiesel, bioethanol, biomethane, synthetic biofuels) or renewable hydrogen and electricity are some of the essential fields of action.

Measures to support the introduction of EFV's should be based on a common understanding about an EFV concept. This means that we jointly should develop a globally harmonised method for evaluating the environmental friendliness of a vehicle taking into consideration regional differences. In developing an evaluation method, focussing solely on the vehicle may not yield the required results. Rather, the development has to consider a holistic approach, e.g. Energy consumption and the emission of greenhouse gases have to be evaluated on the basis of an integrated "well-to-wheels" approach which comprises both the preceding fuel provision chain ("well-to-tank") and the fuel use in the vehicles ("tank-to-wheels"). The possibility of an extensive lifecycle evaluation, which also takes into account the following issues development - production - use - disposal of vehicles, should be examined as well. This should be further developed beyond the vehicle lifecycle considering also interfaces like vehicle and energy supply infrastructure, driver – vehicle interaction (e.g. ITS) and other elements in an Integrated Approach.

It was recommended to have a close cooperation with the World Forum for Harmonisation of Vehicle Regulations (WP.29) of the United Nations in Geneva (UN-ECE). The EFV concept requires an involvement of the two environmental GR groups of WP.29: GRPE (pollutant emissions, fuel consumption/CO₂) and GRB (noise). Future EFV Conferences might be held every two years and will focus on the following issues:

- status report regarding the set goals,
- exchange of experiences with regard to ongoing measures for promoting / introducing EFV's,
- exchange of experiences and problem analysis regarding the legal and economic framework,
- regular status report to the G8-Leaders (according to the decision at Heiligendamm).

3. BASICS FOR THE PREPARATION OF A FEASIBILITY STATEMENT

The main part (chapter 3.) of the background document regarding the EFV feasibility statement (informal document GRPE-58-02) contains a compilation of existing legislation, tools for holistic approaches and assessment concepts (status 2008). The available literature and concepts, including regulations and standards, was screened and analysed. The result of this exercise is an overview about a lot of varying approaches dealing with different environmental aspects. All these regulations, standards, assessment concepts and ranking systems are based on different principles, structures, conditions and timelines. In general the following main aspects are included in these approaches, characterising them:

- system boundaries (end of pipe / tank to wheel, well to tank, life cycle)
- mandatory by legislation or disengaged recommendation
- environmental performance criteria, either single or in combination (two or more criteria)
- performance levels defined as absolute values, or related to reference values (average of fleet or new registered vehicles) or related to a technical reference parameter (vehicle mass, footprint)
- ranking based on a function or defined classes.

Chapter 3. of the background document showed a lot of options to define and evaluate vehicles. However it needs to be assessed whether these approaches can be used for the development of a holistic evaluation concept. This assessment (chapter 4. of the background document) needs to first anticipate the foreseen target groups and the purpose(s) for applying an EFV concept. In a next step of this assessment, it was analysed and listed what environmental aspects are relevant for an EFV concept. Additionally tool evaluation criteria had been specified to describe the dimensions and

applicability of regulations, concepts and tools. A table was developed with an evaluation of the main existing different regulations, concepts and tools against the environmental criteria and the tool evaluation criteria.

Based on this overview of tools versus criteria, an analysis of potential approaches of an EFV concept is possible. The conceptual idea rests upon the so-called SWOT analysis. The idea of this concept depends on the four issues: **Strength, Weakness, Opportunity and Threat** which should be taken into consideration when various approaches with regard to the assessment of the environmental friendliness of vehicles are analysed. The SWOT analysis was used for several of the existing tools.

This assessment in chapter 4. of the background document showed for example that with an analysis of environmental aspects and tool evaluation criteria plus a following SWOT analysis an assessment of the existing tools and approaches is possible and reasonable.

4. FEASIBILITY STATEMENT FROM A PROCEDURAL POINT OF VIEW

It can be concluded, that from a procedural point of view the development of a harmonised EFV concept is feasible by this approach, with the following principle options:

- selection of the most suitable concepts from all existing approaches or tools
- combination of two or more of the existing approaches or tools
- definition of a new EFV concept, not comparable to the existing approaches or tools.

The weakness and constraints of potential EFV concepts are considered in detail in section 6.

5. POTENTIAL TARGET GROUPS, PURPOSES AND FRAMEWORK OF AN EFV CONCEPT

For an assessment of the feasibility to develop an EFV concept it is necessary to understand the political context concerning the motivation of the potential target groups (governments, customers, industry) as well as the purposes and fields of application. The following table gives an overview of the interrelation of target groups and purposes with a first estimation of feasibility.

Potential target groups	Purpose	Comment	Level of feasibility
Local, regional, national or supra-national governmental bodies	Regulations, fiscal systems, road charging	Regulations already in place, specific for certain aspects (emissions, waste), might form the basis for EFV definition but not the other way around.	very low
	Information systems for e.g. public and private procurement	Requires comprehensive information to assess future and current vehicle models. Specific vehicle variant is less important.	high
	Green zones, access restrictions	Too dependent on local conditions; better directly referring to existing regulations. No harmonisation of local aspects possible. Mainly focused on pollutant emissions.	low
	Guidance on strategies for future vehicle technologies (research, demonstration projects, creation of framework).	Requires a long term, globally harmonised EFV concept, assessing technologies based on presumptions and future prospects.	low
Customers	Voluntary information systems for purchasing decisions and raising interest in EFV	Requires easily understandable information for a currently offered specific vehicle variant.	high / very high
Automotive industry	Design specifications	Already available – very specific for each model. Each manufacturer needs to look for a competitive advantage resulting in different strategies and approaches → harmonisation of designs not reasonable	very low

It is not the aim of the EFV activities under the framework of WP.29 to develop an additional legally binding regulation on EFV. Nevertheless, it could be feasible with certain constraints to develop an EFV concept as a recommendation, a harmonised method, commonly applied. It seems reasonable to develop and adopt such a document as a Special Resolution or Consolidated Recommendation under the umbrella of the 98 or 58 agreement.

However, the EFV informal group concluded that a clear positive feasibility statement is not possible from a political point of view for the time being. More guidance from WP.29 and the EFV Conference is needed, with respect to the needs of the target groups and possible applications of an EFV concept.

6. GENERAL COMMENTS AND CONCLUSIONS CONCERNING AN EFV CONCEPT

Theoretically, the environmental profile of a vehicle could be based on a wide range of indicators (environmental criteria). But from a feasibility perspective the different indicators are quite diverse and difficult to capture in a one-size fits all approach. The background study clearly emphasizes these results. The study has analysed different concepts and methodologies (by the SWOT analysis) for the environmental performance of vehicles. None of the investigated concepts is able to assess and evaluate sufficiently the environmental performance on a global harmonised level due to the following reasons:

- An aggregation of different environmental aspects to a single score is based on subjective weightings that would lead to arbitrary and confusing changes in definitions.
- The environmental profile of a product has always to be interpreted against the background of different regional and temporal environmental circumstances.
- Data for all environmental aspects are not available and / or are measured in different ways depending on the region or regulations/legislation.

For example, whereas greenhouse gas emissions or material use are addressing the global effect of climate change and resource depletion, the other indicators are addressing regional or even specific local effects. Even more, there are fundamental temporal differences within even one indicator. For example, looking at the electric power generation for an electric vehicle even the well-to-wheel CO₂ emissions differ between regions (e.g. captured or not in an Emission Trade Scheme avoiding an increase in CO₂ emissions, change in E-Mix over time). This means that the same vehicle driving around a region over a certain time will have a continuously changing environmental profile. This makes a robust definition of an EFV impossible. The environmental performance of a vehicle would need to be evaluated differently depending on the local and temporal environmental conditions. E.g. the emission standard of a vehicle in a mega-city has another relevance than in areas with a very low load of air pollutants.

The SWOT analysis indicates that all different approaches have remarkable weaknesses. Either the approaches are too simple and/or not comprehensive enough to define an EFV or they are too complicated for the targeted groups and the application to them. From a technical / scientific point of view the aggregation of different environmental aspects to a single score is not at all recommended due to the fact that environmental indicators have to be interpreted based on the local

or temporal situation and there is no scientific / technical justification for a setting of weighting factors. Also a flexible approach allowing regional modification within range of globally harmonised weighting factors is not reasonable as this could mean local adjustment factors almost continuously changing over time, different from a town or area to another, leading to a lot of confusion and missing stability for any applications.

In consequence, single scores for defining EFVs shall not be used for comparative assertions (according to ISO14040) as well as the term "environmentally friendly" shall be avoided according to ISO 14021. The reason for this ISO rule is that 'environmentally friendly' is a very comprehensive and bold statement that is not likely to be justifiable looking at all the environmental indicators. It might be the case that e.g. a vehicle has lower NO_x emissions than another vehicle during its life-time, regarding local air quality. However, 'environment' is much more than NO_x emissions and needs to take into consideration also other relevant items as for example CO₂ emissions, other Greenhouse gas emissions, recycling and end-of-life treatment, noise emissions, hazardous substances etc. In consequence, a vehicle having lower CO₂ emissions might be identified as a low-CO₂-emission-vehicle but not necessarily "environmentally friendly". The application of the ISO norm requires a specific definition / wording, not a misleading terminology.

Therefore, any approach for an EFV concept has to assume the following guidelines:

- consider the target group(s) and purpose(s)
- address clearly the approach on a voluntary base
- ensure a technology- and segment-neutral instead of a technology- and segment-prescriptive approach
- concentrate on already existing legislation or tools, and focus on the crucial aspects in order to avoid misleading and information overloading
- take into account national or regional differentiation in order to reflect local/regional legislation and requirements
- take into account the time horizon
- avoid simplification of complex indicators or impacts in a single score
- define a realistic and affordable EFV threshold concept from a customer perspective (a broad share of existing vehicles in all segments)

Additional work may include the evaluation of the interface between an EFV and an "environmentally friendly infrastructure" (e.g. clean fuels and electricity).

7. FIRST OUTLINE OF AN EFV CONCEPT

In the previous sections some principles of an EFV concept are considered. Mainly the disadvantages of a single score EFV definition are described, presuming that such a single score is calculated by mixing up different (environmental) values with incomparable units, applied for different cases (regions, environmental needs etc.). This might lead to the conclusion that an "one size fits all" solution was created.

However, this does not exclude the non-aggregated combination of several environmental criteria or evaluation tools for the development of an EFV concept. In addition the application of an EFV concept may require a simplified structure and ranking parameter, e.g. to be implementable and understandable. As an example one can take the emission levels Euro 1...6, in Europe established as an information system and tool, combining different environmental criteria (pollutant emissions),

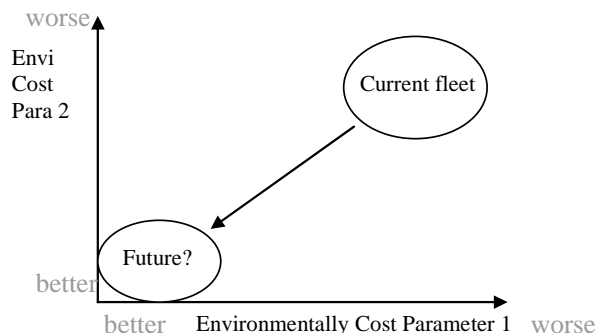
staged on time and performance, simple and understandable. However, several environmental aspects need to be considered and cannot be aggregated to one parameter.

As a starting point, the EFV informal group considered in general the aspects and principles of possible EFV concepts with 2 non-defined environmental performance parameters of vehicles.

A) The Ultimate EFV concept

This concept defines where we want to be in a fully sustainable future regardless of the current state of technology.

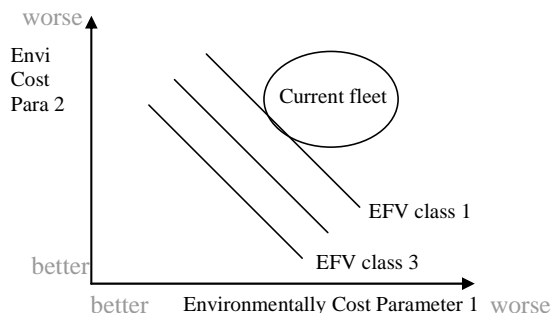
There is no example of such a concept in chapter 4. of the background document (this is more a theoretical concept).



B) The Threshold EFV concept

This concept defines a future sustainable vehicle not existing yet, but imaginable with the current technological ideas (threshold should exclude e.g. most of current technology).

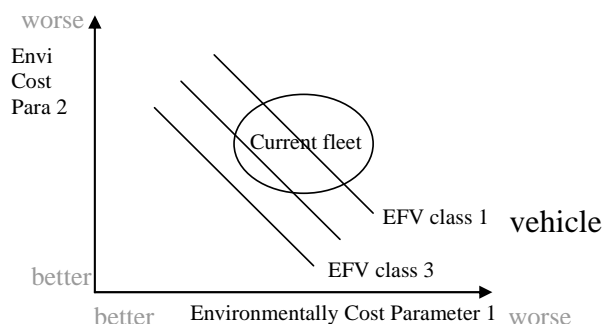
The Threshold EFV concept includes concepts such as top runner principle (3.1.1.1.) from chapter 3. of the background document.



C) The EFV - label concept

This concept defines the most sustainable vehicle based on current technology.

The EFV label concept includes concepts such as rankings (3.3.1. and 3.3.2.) from chapter 3. of the background document.



8. CONCLUSION (FEASIBILITY STATEMENT)

It can be concluded, that from a procedural point of view the development of a harmonised EFV concept is feasible. It seems reasonable to develop and adopt such a document as a Special Resolution or Consolidated Recommendation under the umbrella of the 98 or 58 agreement (instead of a new regulation).

However, the EFV informal group concluded that a clear positive feasibility statement is not possible from a political point of view for the time being. More guidance from WP.29 and the EFV Conference is needed, with respect to the needs of the target groups and possible applications of an EFV concept. In the further definition of the EFV concept, a balance between feasibility and added value has to be found.

From a technical and scientific point of view it is not feasible to develop an entire holistic EFV concept, because there are differences and certain specifications concerning environmental aspects, subjective weightings, regional or temporal circumstances and data availability. A possible way out is to avoid the misleading term EFV concept, but to create specific names fitting to the concept (e.g. LNV-Low Noise Vehicle, LCEV-Low Carbon dioxide Emission Vehicle). In this sense in future "EFV" should be written in quotation marks.

9. PROPOSAL FOR NEXT STEPS

The EFV informal group considered a possible outline, how to continue with the EFV-project (further work and next steps) under the framework of WP.29. This is a 3-step approach with the 4th and 5th EFV Conferences in between, to ensure the needed guidance and feedback:

1st step: Report based on this document to WP.29, and if agreed in general, a presentation to the 4th EFV Conference in India (Nov 2009) - asking for guidance and feedback.

2nd step: The development of a detailed concept and a proposal for an "EFV evaluation method" for passenger cars based on the guidelines detailed in above sections (Name of "EFV" may change). This requires guidance from the political level and it's necessary to identify in further activities a new approach for an "EFV concept" which is not only feasible, but also adds value for the potential target groups and purposes. This potential "EFV concept" could be reported to WP.29 and to the 5th EFV Conference (2011 / 2012).

3rd step: Based on step 2 and supposed the potential "EFV concept" is agreed in general, development of a document (Special Resolution or Consolidated Resolution), and adoption by WP.29.
