

ACTUATE

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D3.1: DELPHI Questionnaire and Report

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Advanced Training and Education for Safe Eco-driving of Clean Vehicles



Background and Summary

The „ACTUATE - Advanced Training and Education for Safe Eco-driving of Clean Vehicles“ Project developed and applied advanced training and education services for the safe eco-driving of clean vehicles in the public transport sector and was funded within the Intelligent Energy Europe Programme.

As various studies and our own result of trainings showed, safe eco-driving has the potential to increase energy-efficiency of bus and tram fleets, hereby reducing their environmental impact and allowing for more economical operation.

We asked various experts on trainings and education of professional drivers (in passenger transport), to answer the questionnaire attached below. The questionnaire was part of a multi-staged expert consultation process that was carried out using the Delphi method. In the context of an increasing introduction of clean, energy-efficient vehicles in public transport across European cities, this consultation process aimed to identify and forecast future trends and (technical) developments regarding the vocational training of professional drivers.

The Delphi survey method was set up such that the questionnaire was answered in two rounds. After the first round, answers were anonymised, refined and a detailed feedback report was provided. A second interview round allowed for further discussion, refinement and clarification of identified trends and developments. The results of this multi-staged survey method were validated statements and a consensus among the experts. In this final report we inform about the scale and scope of all stated opinions.

20 experts from 15 different organisations, among them public transport operators, regional authorities, manufacturers, associations, driving schools and instructors have participated in the DELPHI survey. In the graphic below, you can see a list of all participating organizations.



DPMB, CZ	ASSTRA, IT
Regional authority for basic and vocational training and driver testing, Brno, CZ	Czech Railway Authority (and tram expert), CZ
TEP, IT	DEKRA Akademie, DE
Salzburg AG, AT	Koch Driving School, AT
van Hool, BE	BBG, DE
Driving license authority of the State of Salzburg, AT	LVB
European Driving School Association (EFA)	National Association of German Driving Instructors (BVF)
PKT Gdynia	

Figure 1: List of all organizations participating in the DELPHI survey

Our experts reached a strong consensus on the key issues regarding future trends and developments in the vocational training for eco-driving of clean-vehicles of professional drivers already within the first round of the two-staged consultation process. However, on some issues expert feedback remained diffuse, calling for further clarification. Thus, in round II of the DELPHI process some questions of the first round were modified in order to identify future trends as accurately as possible.

The Questionnaire

1. *"How do you assess the further development of electrically powered buses and trams (as clean vehicles) in Europe over the next 30 years?"*

Experts agreed that the share of electrically powered vehicles in Europe will rise over the next 30 years. However, which type of clean vehicles (tram, trolleybus, hybrid bus etc.) will be introduced and their exact share of the total vehicle fleet is difficult to predict and depends largely on local requirements and circumstances. The experts see a share between 10% and 20% of electrically powered vehicles in Europe's public transport fleet in 30 years; i.e. 2043, which would imply that the White Paper goal with regard to halve the use of conventionally fuelled cars/vehicles by 2030 would not be reached.

Comment: After the first round, a new question was included in order to further clarify the DELPHI results.

According to you, what share of the total public transport vehicle fleet will electrically powered buses and trams have in 30 years?

0-10% 10-20% more than 20%

2. *"When do you expect the share of electric buses in Europe to achieve a critical mass", for which "eco-driving" should be included into the initial qualification of professional drivers?"*

The experts that were consulted suggested that regardless of the actual share of clean vehicles, eco-driving should already today be included in the initial qualification of professional drivers in Europe in order to create awareness among all drivers. Although specific techniques vary for different clean vehicle types, a basic understanding of safe eco-driving and its benefits should be acquired by professional drivers already in the initial qualification phase. Vehicle specific eco-driving techniques should

then be part of on-the-job-training, with training concepts and materials developed especially for each clean vehicle type (e.g. hydrogen buses).

At present in most EU-28 countries for bus and truck drivers eco-driving is only part of the on-going vocational training and not included in the theoretical or practical lessons of the licencing process. For public transport operators this requires additional investments of time and financial resources in order to educate their drivers in eco-driving. A formal integration of eco-driving techniques and know-how already into the licensing process would thus make sense and is recommended by the experts.

3. *“How can the economic and ecological potential of optimised driving behaviour in clean vehicles be exploited throughout Europe? Which channels for disseminating the ACTUATE trainings do you suggest?”*

In order to fully exploit the economic and ecological potential of optimised driving behaviour in clean vehicles in Europe, the experts assumed a strong need for precise, reliable, quantitative data on energy savings and the derived economic savings potential in monetary terms. These numbers should then be communicated at conferences and workshops (dissemination channels) to public transport operators, their drivers and driving schools (target groups) in order to promote the ACTUATE training concepts. Furthermore, a high-level standardisation ensures the wide-spread take-up of the ACTUATE training concepts. For example, about 80% of the safe-eco driving training developed for trolleybuses by project partner Salzburg AG could be adopted by other trolleybus operators without any modification. Adjustments are only necessary with respect to company specific requirements, local circumstances (topography, traffic conditions etc.) and national legislation (implementation of training against the background of Directive 2003/59/EC).

4. *"How could a standardisation on the European level be realised? Which barriers are there concerning a possible standardisation? Is there, from your point of view, the necessity to develop Directive 2003/59/EC further?"*

With eco-driving being one possible topic of the mandatory periodic trainings required by Directive 2003/59/EC, the directive is generally seen as a step in the right direction towards a standardisation of eco-driving training on the European level. Both in Annex I of the Directive and partially in the national adoptions of the Directive such as the "Berufskraftfahrerqualifizierungsgesetz" (BKrFQG) in Germany, eco-driving is already mentioned as one of the possible topics for the periodic trainings. Some minimum criteria for input oriented factors like the qualification level of the instructor/trainer and the characteristics of the classroom exist, but especially for output oriented criteria such as learning outcomes there still is a need to define common minimum quality levels. The learning outcomes themselves need to be realistic, precise and clear. It needs to be stressed that theoretical training concepts are probably easier to achieve than the practical parts (external factors cannot be standardized due to geography, traffic density, etc.).

5. *"Which technological measures could accompany and further increase the energy saving potential of clean vehicle eco-driving in public transport?"*

Regarding further capitalisation of the energy saving potential of safe eco-driving techniques for clean vehicles in public transport, developments and measures in two major areas – infrastructure and vehicle technology – were perceived by our experts as most important. From the infrastructure perspective, traffic light priority, traffic lane design, segregation of tracks and integrated traffic control systems are perceived as the most effective measures to be implemented. With respect to vehicle technology, devices and applications like the ACC

(automatic cruise control), the recuperation of braking energy and electronic devices that allow drivers to monitor and display their energy efficiency in real time are regarded as promising technological approaches to capitalise the energy saving potential of safe eco-driving for clean vehicles in public transport. However, in order to fully exploit the energy saving potential a HOT – human, organisational and technological – framework needs to be developed which integrates all measures into a coherent strategy.

6. *“Will learning under real life conditions (practical training) gain in importance for the education and training of professional drivers in the future? How do you assess the future operational capability of driving simulators [...]?”*

There was a strong consensus that practical training is an indispensable part of successful training and education for professional drivers. It is regarded as more effective and sustainable (better retention of the learning outcomes) than simulator based training. Complex traffic situations and specific local characteristics of the public transport network can hardly be incorporated into standardised driving simulators. As presented on a meeting of the International Road Safety Association (MOVING), driving schools in the freight sector also highlight the importance of practical trainings with regard to the impacts of eco-driving (in comparison to theoretical input/lessons only). Practical trainings are, however, more time-consuming and expensive. Driving simulators were perceived as useful for basic training where a high level of standardisation exists. Their use is however limited to large organisations/ public transport operators that are able to bear the high costs of acquisition and who have a high degree of capacity utilisation for these simulators.

Thus, the experts claimed the need for accurate cost/ benefit analyses and the calculation of economic savings potential and energy savings of practical trainings.

7. *“Which possibilities do you envisage to increase the level of qualification of drivers in public transport or to achieve an enhanced “learning culture”, which could at the same time lead to a more positive occupational image?”*

It was generally agreed that there is a need to improve the public image of professional drivers. Their profession and service should be valued and appreciated by society and more specifically by public transport passengers. The responsibility that professional drivers have for their passengers should be in balance with the salaries they earn.

Overall the perception of the qualification level of professional drivers was perceived to remain at a relatively low level, although professional requirements have increased considerably (e.g. service orientation, technical knowledge of the vehicle etc.). The initial level of qualification for professional drivers in public transport is slightly better than for truck drivers.

Possible solutions that were voiced consisted of increasing the salary and working conditions and improving the initial training, image and educational campaigns.

Comment: In order to further clarify suggestions on how to improve the occupational image of professional drivers and enhance the “learning culture”, the question was more specified during the second round.

According to your opinion, which of the following approaches is suited best in order to improve the occupational image of professional drivers and to enhance the “learning culture”?

Please rate the options from most effective to least effective by assigning them the values from 1 (most effective) up to 6 (least effective).

Results (starting with most effective measure):

1. Improvement of general working conditions (working hours etc.)
2. Increase of drivers' wages as part of a general participation and empowerment programme (with incentives and bonus scheme etc.)
3. Improvement of on-going/vocational trainings
4. Improvement of initial qualification and trainings
5. Image campaign targeting passengers and general public
6. Educational campaign targeting passengers and general public

8. *"Considering the implementation of the EQF categories/ EQF learning outcome approach: to what extent do you see this as an attempt for the creation of a comparable minimum qualification standard for professional drivers in Europe, which would ensure the implementation of Directive 2003/59/EC [...]?"*

Generally, the European Qualification Framework (EQF) was not very well known among the experts. The integral part of the EQF, the referencing of professional drivers' qualifications to the qualifications framework levels, is so far only given for a minority of the EU-28 countries, as only few of them developed a National Qualification Framework (NQF) referring to the public transport area and the EQF. However, the reference status of professional drivers varies widely across the existing examples for Europe and needs to be harmonised at first. For example, the German apprenticeship scheme "BerufskraftfahrerIn" is placed on level 1 of the German NQF, which equals level 4 of the EQF whereas the Dutch formal professional driver qualification is referenced to level 2 of the NLQF, which equals EQF level 2.

Looking at these substantial differences among national qualification standards, harmonisation on a European level is still regarded as a priority goal. For the initial qualification of drivers (licencing)

standardisation among EU members is already partially accomplished, but at the same time obstacles for standardisation for on-going vocational driver trainings remain to exist as there are, for instance, no written exams or practical tests. This makes it difficult to compare, evaluate and verify learning outcomes.

Comment: It was, thus, agreed upon that a core competence profile for professional drivers would need to be identified in order to ensure these minimum qualification standards and comparability.

In order to ensure minimum qualification standards and comparability, do you think it is useful to develop a "core competence profile" for professional drivers in public transport – based on learning outcomes - like it has been developed for drivers in freight as part of the EU project "ProfDRV – Professional driving: more than just driving"?

I think it is useful.

I don't think it is useful.

9. *"To what extent do you consider these developed minimum criteria and learning targets/outcomes to be sufficient for achieving (experts were provided with ACTUATE's minimum criteria and learning outcomes table) [...] a content standardisation of advanced trainings for "eco-driving" of clean vehicles? Which minimum criteria/ learning targets should be added [...]?"*

The minimum criteria and learning outcomes were generally seen as sufficient for achieving a standardisation of the content of advanced eco-driving training for clean vehicles. At the same time regular assessment and an on-going evaluation of learning outcomes of vocational trainings should take place and should be integrated as additional quality criteria. In order to assure comparability while allowing for local adaptation of the trainings, the description of skills, knowledge and competences to be acquired and also the distinction between them needs to be precise and clear.

10. *“Which topics and content elements should [...] be integrated into the education and training of professional drivers in the future – assuming a corresponding development of the clean vehicle market and wider use in public transport?”*

As seen in the light of increasing share of clean vehicles (and e-mobility in general) three fields of knowledge were identified as most relevant for the future education and training of professional drivers:

- a) knowledge about the dynamics of vehicle movement (and the effect on passengers)
- b) knowledge about safety issues and
- c) technical knowledge about the functioning of electric, clean vehicles.

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