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and Environment****Steering Committee of the Transport, Health
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**Implementation of the Transport, Health and Environment Pan-
European Programme: Implementation mechanisms of the Transport,
Health and Environment Pan-European Programme****Guidelines for National Eco-driving Initiatives*****Submitted by Austria***Summary*

The Guidelines for National Eco-driving Initiatives have been developed under one of the Partnerships of the Transport, Health and Environment Pan-European Programme (THE PEP).

The Policy Recommendations for Eco-driving, which are part of this document, have been endorsed by the Fifth High-level Meeting on Transport, Health and Environment (Vienna, 17–18 May 2021).

This document presents the complete Guidelines for National Eco-driving Initiatives to the Steering Committee of THE PEP.

* The present document was submitted unedited.



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I. Introduction

1. The present paper focuses on the sustainable and energy-efficient use of motorised vehicles (particularly cars, trucks and buses), which is often referred to as eco-driving.
2. THE PEP (Transport, Health, Environment Pan-European Programme) is a joint programme of UNECE and WHO. It brings together national transport, health and environment ministries from 56 European countries with the aim to advocate environment-friendly and health-promoting mobility all over Europe.
3. The recommendations at hand were compiled in the framework of the “THE PEP Partnership on eco-driving”, which was initiated and is led by Austria with a strong focus on international cooperation. The partnership contributes to the implementation of the THE PEP Paris declaration “City in motion – People first!”, to reduce emissions of transport-related greenhouse gases, air pollutants and noise, as well as to promote policies and actions conducive to healthy and safe modes of transport.
4. The situation of eco-driving integration and development in the THE PEP member countries is very diverse. This paper offers an overview of which elements for eco-driving programmes are most crucial and which requirements need to be considered. It was compiled making use of know-how and experience coming from several national initiatives and European projects. The aim is to lay the basis for successfully establishing national eco-driving projects and programmes in countries or regions, especially where there are still few or no eco-driving programmes.

A. Why eco-driving?

5. Eco-driving is an easy but efficient way of driving and saving money while still allowing a high degree of flexibility and individuality. It can be applied by any driver in daily practice with all vehicles and in all traffic conditions – without expensive investments in infrastructure or new vehicle technologies. Eco-driving makes optimum use of today’s technology, modern engines and advanced vehicle technologies. Eco-drivers not only save money but, generally, drive more safely, look after their cars and tend to enjoy driving more than other drivers as the techniques reduce stress.
6. All the benefits mentioned can be achieved in equal or reduced travel time. Experience shows that eco-drivers do not take longer to reach their destination, but are often even faster. This is mostly due to accelerating traffic flow and thus avoiding stops.

B. How to eco-drive?

7. An elaboration of eco-driving techniques is the core part of all eco-driving seminars and trainings. The most important eco-driving techniques (also called “Golden Rules of eco-driving”) have been defined on European level and are presented below in brief:
 - Greater anticipation in order to avoid unnecessary acceleration and braking and make maximum use of the vehicle’s momentum
 - Maintain a steady speed at low RPM (revolutions per minute)
 - Shift up early (by approximately 2,000 RPM)
 - Check tyre pressures frequently
 - Remember that all ancillary loads add to fuel consumption (electrical equipment, air conditioning, carrying dead weight, etc.).
8. Of course, there are more driving techniques which are also relevant for eco-driving. Furthermore, there are eco-driving tips not directly related to driving, such as:
 - Fuel saving starts with choosing a low-emission car

- Avoid short car trips as cold engines need much more fuel per km
- Organise a carpool and
- Consider alternative means of transport (cycling, walking, public transport, car sharing).

C. THE PEP Partnership on eco-driving

9. Eco-driving was chosen by the THE PEP steering committee as the subject for a THE PEP partnership as a suitable instrument for sustainable mobility. THE PEP Partnership on eco-driving was launched at the THE PEP klimaaktiv mobil conference 2014 in Vienna with a strong focus to exchanging experiences among interested partners for the promotion of eco-driving.

10. The THE PEP Partnership on eco-driving contributes to the five priority goals of the THE PEP Paris declaration by building capacities for promoting an eco-driving style that supports the achievement of these goals. In particular, the partnership sets targets on reducing emissions of transport-related greenhouse gases, air pollutants and noise (goal three). Furthermore, it also contributes strongly to promoting policies and actions conducive to healthy and safe modes of transport (goal four).

5th High-level Ministerial Meeting of the Transport, Health and Environment Pan-European Programme (THE PEP)

11. Hosted by Austria, the 5th High-level Ministerial Meeting of the Transport, Health and Environment Pan-European Programme (THE PEP) of UNECE and WHO took place in Vienna from 17 to 18 May 2021. Due to the COVID-19 pandemic, the conference was held as an online event.

12. The Ministerial Meeting, which was held under the motto “Building forward better by transforming to new, clean, safe, healthy and inclusive mobility and transport”, included 24 international specialist webinars and an accompanying virtual exhibition. More than 850 participants from 41 countries, among them 46 transport, health and environment ministers and state secretaries from UNECE and WHO member states, accepted Austria’s invitation and attended the virtual High-level Ministerial Meeting, making it the largest THE PEP Ministerial Meeting in the programme’s history.

13. Within the High-level Ministerial Meeting, the Vienna Ministerial Declaration “Building forward better by transforming to new, clean, safe, healthy and inclusive mobility and transport” was adopted. This has paved the way for climate-friendly and active mobility at pan-European level in the 56 countries involved. In the Vienna Declaration, the European transport, health and environment ministers agreed on the development of a pan-European strategy for climate-friendly mobility and adopted recommendations on how to deal with the effects of the COVID-19 crisis on the transport system by expanding a healthy and climate-friendly transport and mobility system.

14. Under the Declaration’s heading “THE PEP: fostering the transformation to achieve our vision”, the member states agreed to endorse the practical results and recommendations achieved in the Partnership on eco-driving. In addition, it was decided to further develop the partnership by requesting the Partnership on eco-driving to explore the extension of eco-driving to electric vehicles and other forms of transport and non-road mobile machinery. The THE PEP Policy Recommendations for eco-driving, which are provided in the document at hand, were elaborated under THE PEP Partnership on eco-driving and adopted in the Vienna Ministerial Declaration by the member states.

15. THE PEP partnership offers exchange of experience as well as implementation of eco-driving trainings and education seminars for driving trainers in respective countries: Austrian eco-driving master trainers conduct pilot trainings for taxi drivers, bus drivers and driving instructors in THE PEP member countries, e.g. in Kazakhstan and the Russian Federation.

**THE PEP eco-driving Pilot Workshop in Almaty, Kazakhstan,
April 2014**

- Two-day passenger car and one-day bus training seminar and practice with three Austrian master trainers
- Participants: 17 driving school teachers and 13 bus drivers of Almaty public bus fleet
- Concluding workshop chaired by the Vice-Mayor of Almaty with 30 stakeholders
- Results from the trainings with passenger car: average fuel reduction of 6–22%!

**THE PEP eco-driving Pilot Workshop in Kaliningrad, Russia,
September 2014**

- Three-day bus training seminar and practice with three Austrian master trainers
- Participants: 10 driving school teachers and two bus drivers from a Kaliningrad local mini-bus fleet
- International workshop on urban mobility and environment chaired by the Vice-Mayor of Kaliningrad with 40 stakeholders.

Lessons learned from pilot trainings

- The eco-driving training concept is applicable to the traffic in the metropolitan areas of both Almaty and Kaliningrad.
- Approaching and leaving the bus stop bay/area needs to be trained specifically as there is a great potential for fuel saving.

Fuel consumption monitoring devices are crucial to the success of eco-driving as they provide the driver with necessary real-time feedback information that allows them to adapt the driving style.

16. The partnership is coordinated by Robert Thaler, Head of Division Active Mobility and Mobility Management in the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK).

II. THE PEP Guidelines for Eco-driving Initiatives

A. Ensure longevity of the eco-driving initiative

17. Establish a long-term body which is responsible for the eco-driving programme. This could be a ministry, an energy agency, an association of driving schools, an automobile club, an organisation dealing with traffic safety, or a company experienced in the field of driving education.

18. The organisation should have good contacts with relevant political bodies as well as companies which are possible customers for trainings. Search for active collaboration with automobile clubs, fleet associations, the car industry, car importers, authorities, public administration, etc. The goal is to establish an eco-driving infrastructure which will keep the approach alive in the long term.

1. Embed the programme into a long-term strategy (including long-term funding)

19. Experience shows that eco-driving initiatives which are set up and financed only for a relative short period of time (e.g. two years or even five years) tend to have poor lasting effects afterwards.

20. Thus, try to embed the topic of eco-driving into an official long-term national policy or strategy, possibly on energy efficiency or climate protection, which is signed by relevant government representatives. For example, in Austria, eco-driving is integrated in the national energy and climate strategy as a measure to be implemented in the long term. Also, try to ensure a long-term contract with relevant funding bodies or sponsors.

2. Integrate eco-driving trainings into existing programmes and regulations

21. Experience shows that eco-driving trainings are rather hard to sell at market price. Therefore, it is very helpful if eco-driving can be added to mandatory training programmes, such as the curricula for practical training for learner drivers within driving education or the advanced training education for bus and truck drivers (Directive 2007/46/EC). Another approach is to try to combine eco-driving trainings with obligatory training for drivers seeking to regain their licences after having lost them due to motoring offences. Eco-driving can also be integrated into the energy and environment management systems of companies (ISO 50001, ISO 14001).

3. Funding by third parties

22. Given that eco-driving reduces accident rates, there is a good reason to seek funding for training from insurance companies. This has been tried before and experience shows that insurance companies may be reluctant to get involved. However, securing an effective partnership with an insurance company funding training remains an attractive, if often elusive, option. Leasing companies might also fund training for their clients and this approach has had some success in the past in some countries.

B. Get expertise and experts

1. Investigate the current status of eco-driving

23. Check whether there have been existing eco-driving initiatives or projects in your country, be it from individual bodies or training providers or in context of an international project. Identify and analyse the specific national or local circumstances and obstacles towards the implementation of eco-driving.

2. Make use of external experience

24. In case there is no experienced eco-driving body in the country or region yet, consider involving an experienced partner of another country which already has been running an eco-

driving programme for a long period of time. They can provide individual advice on important matters which may apply in the starting phase of a new programme.

3. Establish a consortium of eco-driving master trainers

25. Find a group of motivated to-be master trainers. These should be driving instructors who are experienced in giving further education to other instructors.

26. Educate some master trainers. External master trainers from experienced countries are essential for such an initial seminar. The number of master trainers should be sufficient to cover the whole country regarding further training seminars. For example, in Austria, there are six eco-driving master trainers based in different parts of the country. This consortium of master trainers has educated and certified around 1,000 driving instructors in around twelve years.

4. Set standards for train-the-trainer seminars

27. Define minimum standards for eco-driving trainings and trainer education in terms of minimum duration (both regarding the practical and the theoretical part), maximum number of trainees per trainer and content of seminars and trainings.

28. Compile handbooks and teaching materials in national language using available documents and consultancy of experienced partners from other countries.

29. Include all technical components of eco-driving (background information, facts and data on eco-driving), but also didactical basics on how eco-driving can be best taught to learners and licensed drivers.

30. Take national circumstances and preconditions into account. It is important to achieve a balance between being sufficiently flexible to accommodate national differences – particularly regarding the legal situation, training requirements and preferred workshop format – whilst still profiting from the benefits of international experience.

5. Qualify and certify eco-driving trainers (train the trainers)

31. Start a training programme for a larger number of eco-driving trainers, led by the national master trainers. The number of required instructors again depends on the country.

32. A training seminar for to-be eco-drivers with passenger cars typically requires a two-day seminar including theoretical as well as practical training. The eco-driving training with cars is to be seen as basis seminar, which can be followed by an advanced training course for eco-driving with utility vehicles (trucks and buses). Some eco-driving programmes also include eco-driving trainings specialising on trams, trains, tractors, or construction machines. Such an advanced seminar also typically requires a two-day seminar including theoretical as well as practical training lessons.

33. Also, define a testing procedure which a prospective eco-driving trainer needs to pass. Establish a certificate for new eco-driving trainers stating that they successfully completed the training seminar.

34. Always keep in mind that the role of the eco-driving trainer is paramount for the success of the training and motivation of drivers in the long term.

C. Emphasise all benefits of eco-driving (and not only fuel cost saving)

35. Eco-driving offers numerous benefits: it not only saves fuel and money, but also works as a road safety tool and improves the quality of the local and global environment.

36. Results from eco-driving projects all over Europe prove that trained drivers can easily reach average fuel reductions of 5–10% for trucks and buses, and up to 10–20% for cars by practicing an energy-efficient driving style.

37. Hence, the most important personal and immediate benefit of eco-driving is the saving of fuel costs. As the effects outweigh the costs for trainings by far, eco-driving trainings are a very cost-effective environmental measure.

38. Moreover, eco-driving helps to realise a number of further positive effects:

- Eco-driving reduces not only fuel costs, but also costs for maintenance and car repairs after accidents. Eco-drivers cause less wear and tear on car parts (tyres, brakes and engine) and are less prone to accidents
- Climate protection and saving of resources: eco-driving contributes to a substantial reduction of fuel consumption, thus reduces greenhouse gas emissions
- Reducing health risks: fewer toxic exhaust gases and particulates resulting in a reduced impact on the local environment
- In particular, low RPM gear changes, which apply through eco-driving, can reduce NOx emissions significantly (by 50% and more) compared to high RPM, which apply when driving aggressively
- Passengers of eco-drivers enjoy a more comfortable experience due to a smoother driving style (smooth use of the accelerator, steering, transmission and brakes)
- Enhanced traffic safety by widening the scope for action (i.e. anticipatory driving, compensating an irregular traffic flow by greater buffer distance)
- Benefits for both drivers and passengers also include increased safety on the roads and less noise generated.

39. All the benefits mentioned can be achieved in equal or reduced travel time. Experience shows that eco-drivers do not take longer to reach their destination, but are often even faster. This is mostly due to accelerating traffic flow and thus avoiding stops.

D. Understand the importance of practical trainings

1. Eco-driving tips vs. practical training

40. There are a lot of lists on websites and documents with eco-driving tips and techniques. Also, there are a lot of seminars offered, some of which targeting professional drivers of trucks and buses, which only consist of theoretical training. However, in order to really change driving behaviour and save fuel in the long term, it is not sufficient that drivers just try to follow some tips listed, but they need to attend an eco-driving training given by a qualified driving instructor. Such training combines theoretical classroom sessions with practical driving on public roads.

41. The emphasis on practical driving in public traffic provides drivers with first-hand experience of eco-driving in real-world traffic. Furthermore, it ensures that the eco-driving trainer will focus on the actual driving style of the driver (including poor driving habits). The eco-driving trainer needs to address behavioural patterns that have been internalised over years and should try to take account of a driver's social and cultural preconceptions. For example, it will be hard to encourage a driver to shift up early whilst applying moderate gas pedal if he thinks this combination might strain an engine or waste fuel.

42. But if a trainer is aware of the driver's reservations then he or she can address them head-on, for example, by explaining that regardless of the accelerator pedal position, a modern engine will not inject excess fuel.

43. In order to be able to demonstrate the specific fuel consumption of different driving styles, make sure that fuel consumption monitoring devices are available for the vehicles used in practical eco-driving trainings.

2. General structure of practical trainings

44. It is important that drivers experience the effect of eco-driving directly. This is best achieved when the practical part contains driving the same route (of about 20 minutes) twice,

while fuel consumption and duration of the trip are measured by means of a board computer. Thus, comparisons of fuel consumption (and resulting costs savings projected for a year) before and after the training can be instantly made and used as an eye-opener for drivers.

45. For the first drive, the participant is advised that he or she should drive as usual. The trainer gets a general idea of the participant's driving style, but does not give any information or tips on economical driving.

46. Between the first and second drive, a theoretical part will take place. Depending on the setting of the training course (one-day seminar or short-duration training, see Chapter 7), the theoretical session will be shorter or longer accordingly.

47. In the second drive, the participant is taught economic driving in relation to their personal driving style and the technology of their specific vehicle, and in particular what has been learnt in theory is put into practice. The trainer promotes the strengths of the drivers and minimises the weaknesses. This ensures that the technology corresponds to the personal driving style and the vehicle is used correctly.

48. After the second drive, the trainer uses the values of the on-board computer to give an overview of the comparison between the two drives. Usually, the values of the second drive are better than the values of the first one, however, traffic or weather influences can also lead to worse values (traffic jam, slow vehicle, wind, rain). This would be discussed with the participant in the vehicle. Any deficiencies of the participant would still be communicated to him as practical tips.

49. Such practical trainings must be on public roads and should be in an area with medium traffic (no congestion but also no empty roads). Following this view, training with eco-driving simulators can never substitute practical trainings but can still be very useful and could be considered as a complement to the practice session. Additionally, simulators may serve, possibly on locations such as events or fairs, as a teaser on the subject, in order to motivate drivers to apply for an eco-driving training which also includes a practical part.

E. Plan the roll-out of eco-driving training courses

1. Identify your key target groups

50. Consider possible main target groups for the eco-driving training offers. These include:

- Private companies with vehicle fleets (in particular cars, trucks and buses)
- School bus drivers, taxi drivers
- Drivers of public administration divisions (federal, state, municipal)
- Police, federal armed forces, railway services, post office
- Other public transport operators
- All users of private cars.

51. The enforcement of eco-driving in public fleets – probably including emergency services (police, fire, ambulance) – can work well to promote the concept by giving good examples and raise its acceptance.

2. Identify your key messages

52. For most eco-driving campaigns, by far the most popular marketing message used are the financial benefits of reduced fuel consumption. Other popular messages are the safety benefits and the concept of eco-driving as a better or more modern way of driving. The idea behind promoting eco-driving as better or more modern driving is to position it as an aspirational behaviour that people will want to achieve, rather than something they feel they ought to do. The environmental benefits are a popular additional message as well as reduced driver stress.

3. Produce marketing materials and promote eco-driving trainings

53. Awareness-raising campaigns should target both novice drivers and experienced drivers. Prepare leaflets and giveaways aimed at your target groups, which can be used for marketing your training offers and transporting the key messages and benefits.

54. Such leaflets or giveaways are also worth being offered to drivers at the end of their eco-driving training. Leaflets can provide a good opportunity to reiterate the eco-driving techniques and tips as well as safety and fuel-saving benefits of eco-driving, to encourage drivers to monitor their fuel consumption and, of course, to use eco-driving techniques in their day-to-day driving.

55. Giveaways should be designed to remind drivers of their training and are usually branded with a website URL or other contact details for further information. Some examples of eco-driving giveaways include tyre pressure gauges, car stickers, windscreen scrapers and sun shields, car 'first aid kits' and devices to help calculate fuel consumption.

4. Start with targeting fleets that are already among your contacts

56. In the starting phase of an eco-driving programme, it is helpful to motivate companies by some kind of incentives, like a special price for the training or even for free. Make sure that such initial subsidised trainings are well documented, including a comprehensive before/after evaluation over a certain period of time (e.g. three or five months, up to one year). In this way you will be able to prove to other companies that the trainings do work and can indeed achieve the desired benefits.

57. Another option is to seek to embed eco-driving training into company processes, for example, as part of the general induction training for new employees, in conjunction with vehicle purchasing, or relating to companies' environmental policies. Sustainability managers are a good first contact as they have their own targets in terms of energy (and thus fuel) reduction and are therefore more likely to be interested in the subject than fleet managers or general managers.

5. Prepare certificates for participants of eco-driving training courses

58. Certificates for drivers stating what the training was and when and where it took place are easy to produce and might hopefully be put in a visible place like an office wall or a kitchen notice board where they will serve as a reminder to the participant and perhaps encourage questions and interest from colleagues.

6. Calculate individual effects on an annual basis

59. Certificates can also include information about potential annual savings of fuel, money and CO₂. These figures will be more effective if they are tailored to the individual driver and this is relatively easy to do: if the coach asks and makes a note of each driver's annual mileage, typical fuel consumption in their own vehicle and fuel type (this is necessary to calculate CO₂ savings), then it is possible to calculate how the percentage reduction in fuel consumption seen on the day of training would translate into annual savings of fuel, money and CO₂. This information can be added to the certificate.

60. There will often be plenty of interest and comparison of results when displayed on certificates, which again can help keep eco-driving at the front of drivers' minds.

61. The aggregated results can also be collated into a spreadsheet for the fleet manager showing the potential annual savings for the fleet. As with the certificates, this information should not be presented as the savings that the fleet should now expect to see, but as savings that could be achieved if the percentage improvement seen on the day were maintained for a year.

7. Advise how to increase the longevity of benefits

62. A key question about eco-driving training is to what extent and for how long the benefits last after training. It usually takes more than a one-time training course to ensure drivers use their vehicle efficiently for a longer period of time.

63. For fleets, the extent of the long-term savings will be influenced greatly by related policies and management practices post-training.

64. Give examples to fleets how they could implement a range of measures to increase the longevity of fuel savings and further benefits. These include periodically providing drivers with reminder information about eco-driving, monitoring individual drivers' fuel consumption, producing fuel consumption comparison tables to encourage competition between drivers, offering incentives to reward the most efficient drivers, and additional help and advice for the most inefficient.

65. Incentive schemes to identify and reward the most efficient drivers need not cost much and can be an effective means of promoting eco-driving. Such incentives are usually organised on a monthly basis and examples include awarding cash or shop vouchers to the most efficient driver, having a favoured high-spec vehicle that is allocated monthly to the most efficient driver, and funding a monthly social event for the most efficient team.

8. Advise to monitor fuel consumption constantly

66. If drivers are aware of their fuel consumption, they will realise the on-going benefits of eco-driving and are therefore more likely to continue to use the techniques. So, at the end of each training session and as a note included in any print products given to trainees, it is recommended to encourage drivers to observe their fuel consumption in their day-to-day driving. Today, most cars and several vans have trip computers that display fuel consumption. Otherwise, the manual alternative is to completely fill the tank and zero the odometer at the service station. As a second step next time, it is recommended to fill the tank up completely again and to note how much fuel has been used and also which distance has been driven since the previous fill. These two values allow calculating average fuel consumption.

67. Monitoring fuel consumption is especially important for private drivers, as there is less scope for directly influencing private individuals' behaviour in the months and years after training. However, if we can encourage drivers to get into the habit of monitoring their own fuel consumption, then they will remain aware of the benefits of eco-driving and are more likely to continue employing the techniques. Some suggestions for helping to 'lock-in' the benefits of training for both fleet and private drivers are discussed below.

68. There are several applications for mobile devices available which can be very helpful for monitoring fuel consumption.

9. Eco-driving competitions

69. One option is to implement eco-driving competitions in which the driver(s) using the least amount of fuel for a given trip receives a prize. Celebrities taking part in the competition raise interest both of the audience and the media.

70. Focus on getting media involved in order to generate articles in relevant journals which adopt a positive attitude towards the eco-driving idea. A useful measure is to include journalists or other opinion makers in the competition. A setting which worked well in Austria was to organise an eco-driving competition between motor journalists and environmental journalists.

10. Training for private drivers vs. training for company drivers

71. Marketing for eco-driving trainings proves to work well with regard to companies, especially for truck and bus drivers, as fleet managers can easily see that eco-driving courses have a very short payback period. In contrast, it is very difficult to motivate private drivers to attend a driving course after they had passed the driving exam years or decades ago. The vast majority of drivers are convinced that they are above-average drivers themselves. Moreover, when confronted with eco-driving tips, many drivers are (falsely) convinced that they follow the eco-driving rules anyway.

72. Probably the best possible way to reach private drivers is to get them involved in eco-driving lessons before they even start driving – by integrating eco-driving in a comprehensive way into driving education in driving schools. In order to reach this goal, eco-driving needs to be implemented in the curricula for driving education as well as driving testing.

Additionally, a large number of driving instructors are to be taught in eco-driving train-the-trainer seminars.

F. Understand the barriers and how to overcome them

1. Factors affecting driving style

73. Driving style is influenced by a complex mixture of technical, social, psychological and cultural factors. How a driver reacts to a given situation is more likely to be influenced by factors such as his or her age, values, social position, concentration, stress and attitude to risk than by traffic regulations or the driver's ability to use the vehicle controls. It is, thus, more a question of attitude than ability.

74. Eco-driving trainings therefore need to address behavioural patterns that have been internalised over years and should try to take account of a driver's social and cultural preconceptions.

2. Main obstacles to eco-driving

75. The main obstacles deterring people from eco-driving is the poor level of knowledge about this concept within today's society or the misconception that eco-driving means slower driving with less fun. Most drivers will already have established their own driving style, preferences and prejudices with which they feel comfortable. In many cases, these may be at odds with the principles of eco-driving. This is particularly the case for people that learnt to drive decades ago, whose driving style may have been well suited to older vehicles but is not optimised for modern vehicles and engines.

76. Furthermore, many drivers assume incorrectly that eco-driving is easy to put into practice without appropriate practical training and that they are following the eco-driving rules anyway.

77. A particular challenge are eco-driving trainings for truck or bus drivers with decades of experience. These drivers naturally consider themselves driving professionals and are very sceptical that trainers could teach them how they might do better in their profession. Sometimes participants of training seminars are opposing the idea of getting trained at all.

3. What makes a great eco-driving trainer?

78. Of course, a good eco-driving trainer needs to be an expert on the subject and be able to respond to all technical questions of sceptical participants. However, a good eco-driving trainer also understands how to address the concerns and barriers described above right from the start of the training seminar. The aim is to get participants "on board", i.e. to convince them of the ideas of eco-driving and ideally to make them eco-driving ambassadors subsequently. The trainer's role is not just to transfer information but to understand the trainee's interests and objectives and to assess their motivations. The trainer becomes an ally and a motivator helping the driver to improve his or her skills and competences and to achieve their goals.

79. A good coach will seek to establish whether a driver is there voluntarily or just at of his or her employer's request, and whether the driver is interested in financial savings, the environment, road safety or developing a smoother and more relaxed driving style. For example, a driver might say he or she is not interested in fuel costs – they being at the charge of the company – and does not believe in climate change, but the coach may realise the driver has a young family and wants to drive as safely and as smoothly as possible. In these circumstances the trainer might then focus on anticipation as the key to more economical, safer and smoother driving.

4. Success factors for driver trainings for company fleets

- Good training projects should address genuine existing stakeholder needs and offers should maintain a strong focus on the benefits that they can bring to the responsible personnel (i.e. fleet manager, financial director, managing director).

- Practical experience is the best advertisement! It is a good idea to get the responsible personnel involved from the beginning. You may offer an initial eco-driving training for free to the managing director and/or the fleet manager.
- Emphasise the importance of practical trainings. In order to really change driving behaviour and save fuel in the long term, it is not sufficient that drivers just try to follow some tips listed, but that they should also attend an eco-driving training given by a qualified driving instructor.

G. Include training programmes for drivers of different vehicles

80. The most common eco-driving seminars are for drivers of passenger cars and for drivers of utility vehicles (trucks and buses). These are described in brief below. Further eco-driving programmes address steering trams, trains, tractors, or construction machines; or even railed vehicles such as trams or railway traction vehicles. Of course, the eco-driving trainers need to have comprehensive knowledge of and experiences with the vehicles the courses are focused on.

1. Full-day eco-driving trainings for drivers of passenger cars

81. Eco-driving training courses typically take one full day with four participants per trainer. There are also half-day trainings offered in several countries, sometimes combining eco-driving lessons with traffic safety trainings. Such courses can be attractive for users and well accepted by participants. However, some eco-driving programmes revealed that practises such as skidding manoeuvres tend to distract the focus of participants away from eco-driving.

82. The typical structure of a full-day training is as follows:

Theory (100 minutes)

- Awareness of one's own driving style through a questionnaire (questionnaire remains with the participant)
- Elaboration of the contents
- Distribution of documents with main topics
- Discussion points are noted and taken into special consideration during practical training.

Practical training (2 x 100 minutes)

- 2 or 3 participants in the vehicle (driver + 1 or 2 observers, trainer joins at least for one route per driver)
- Vehicle check, specification of route, observation task by observer Debriefing (60 minutes)
- Exchange of experience
- Repeating priorities with questionnaire
- Issue certificates.

83. There are also training concepts applied by some eco-driving initiatives in which the first practical drive is done right at the beginning of the seminar followed by the theory part and the second drive thereafter.

2. Short-duration trainings for drivers of passenger cars

84. As full-day trainings sometimes appear to be too time-consuming both for private drivers and fleet managers, short-duration trainings are offered as well to reduce the amount of time needed for the training to only one hour per driver, while still providing considerable effects. Such trainings typically take around one hour per person.

Short-duration eco-driving training is appropriate for all drivers of cars and vans up to 3.5 tonnes gross vehicle weight. The training is effective for high or low mileage drivers, private individuals or company drivers, and newly qualified or highly experienced drivers. Drivers of heavier vehicles should seek specialist heavy-duty vehicle eco-driving training.

85. Yet, short-duration eco-driving training does not provide sufficient time for coaches to convey comprehensive information on the subject. As a result, the coach should limit the scope of training to the topics the driver is willing and able to deal with. If the trainer can lay the foundation for self-motivated change in driver behaviour and appreciation of the benefits of eco-driving during this short training, then the driver is likely to continue practicing the techniques and will perhaps even seek more in-depth training.

86. The objectives of short-duration eco-driving training are:

- To convey the three core eco-driving tips. These are the tips that have the greatest impact on fuel consumption.
- To provide drivers with first-hand experience of eco-driving in real-world traffic.
- To give drivers an enjoyable and positive experience as this will make them more likely to apply the tips in their normal driving.
- To promote a safe and efficient driving style in a time and cost-effective way.
- The training may also motivate drivers to opt for longer, more in-depth eco-driving training.

3. Structure of short-duration eco-driving trainings

87. In short-duration trainings, each participant drives two laps of an identical route on public roads, the first in his or her normal driving style and the second whilst being coached and instructed to adopt eco-driving techniques. Fuel consumption is measured for both laps, so the trainees can see the improvement for themselves. Discussion and two-way feedback are an integral part of the training, hence, training should include a brief 'warm-up' discussion before the driving begins and feedback sessions after both laps.

4. The coaching method

88. One important component of eco-driving trainings – especially of short-duration trainings – is the use of the coaching method. An eco-driving trainer is educated to act as a coach for the driver, supporting him in achieving an excellent performance in safe, economical and environmentally friendly driving.

89. As abovementioned, short-duration eco-driving training cannot provide trainees with complete information on the subject. Moreover, the coach's role is not just to impart information but to understand the trainees' objectives and to analyse their motivations. Overcoming specific objections and deep-rooted concerns of the driver is the key to ensuring that a driver really believes eco-driving is realistic and practical. If a coach can achieve this, the driver will be far more likely to adopt the techniques in day-to-day driving.

5. Eco-driving trainings for drivers of heavy-duty vehicles

90. Eco-driving trainings for trucks and buses typically take one full day, following a similar structure as described for seminars for drivers of passenger cars. The practical training here typically includes maximum two drivers per vehicle and trainer.

91. There are several ways how to combine theory and practical lessons in the seminar for drivers of heavy-duty vehicles.

92. If feasible, it is advisable to include a third trip which could be called consolidation level. At this stage, the driver would only be accompanied by the trainer as a coach and should be able to implement everything independently that he or she had learned in the second drive. The trainer leads mainly with questions.

93. If the driver has not yet mastered one or the other topic regarding the implementation of economical driving, the third trip offers the opportunity to practice this once again. In

addition, parts which were not covered in the second trip can also be practiced during the third trip.

94. The first trip represents the starting level of the driver before the training, the second trip contains parts of the training level as well as the strengthening level, and the third trip constitutes the application level of the driver after the training.

95. The fuel consumption values of the third run are generally better than those of the first, but usually worse than those of the second one.

96. After all trips, the trainer and the driver should summarise and repeat the personal focal points for economical driving.

H. Focus on eco-driving in electric vehicles

1. Why you should focus on EVs

97. In recent years, electric vehicles (EVs) have been deemed to be very promising in reducing traffic-related energy consumption, pollutant emission and noise. When electricity is produced from renewable energy sources, mobility virtually without emissions and pollutants becomes possible.

98. On the other hand, recent research shows that significant additional energy savings without loss of time can be achieved when applying eco-driving techniques which are specifically directed at EVs. In fact, the driving style of electric vehicles has a much stronger influence on energy consumption (and thus the achievable range) compared to vehicles with internal combustion engines. While the fuel reduction potential for conventional cars is generally quantified with 10–15%, an energy reduction of up to 30% can be realistically reached with EVs when applying eco-driving.

99. Moreover, energy-saving driving has much more positive effects on electric vehicles than on conventional models, as efficient driving increases the range of vehicles, which is still considered a major drawback of EVs by potential users. Thus, EV eco-driving training is about range extension as much as anything.

100. Another substantial positive side-effect of eco-driving trainings focusing on the use of EVs is that private drivers are also keen on participating in trainings with the new type of vehicle category – a target group that is usually difficult or impossible to reach with previous eco-driving offers.

2. “Undercover” eco-driving training

101. Electric vehicles are an excellent option to get private drivers into eco-driving trainings – without even mentioning the term eco-driving. Drivers who make their first drive with an EV understand that they need some kind of instruction. There are several aspects in which EVs generally differ from ICE (internal combustion engine) vehicles. Of course, new EV drivers need to gain knowledge about the new way of charging their vehicle. EV training needs to be product training as much as eco-driving training, as drivers want (and need) to know about their EV’s controls, modes and displays, what the eco-mode does (e.g., it might reduce the power of the heater and A/C, limit the acceleration, etc.) and how to adjust the level of regenerative braking.

102. Experience shows that using regenerative braking correctly alone results in significant energy reduction and improves traffic safety. However, it is important to point out that not all EVs are the same. For example, some vehicles have different driving modes that affect driving experience, energy consumption and regeneration potential. This means that eco-driving tips (and training) will be different for different types of EVs.

103. First-time users are keen on making the best use of their new vehicle, especially on how to reach a maximum possible range. Thus, they are interested in knowledgeable and suitable instructions. Trainings given by qualified and certified e-mobility trainers will include not only the specifics of electric vehicles but also general eco-driving techniques, thus influencing driving behaviour also with regard to the use of conventional vehicles.

3. Get familiar with specifics of EVs which are important for eco-driving

104. There are a number of specific techniques of EVs which make eco-driving slightly different to the techniques applying to conventionally fuelled vehicles. It is important that eco-driving trainers get familiar with this specific knowledge, so further education for eco-driving trainers is essential.

105. Specifics of EVs which are important for eco-driving include the following points:

- Select driving mode
- Avoid “full throttle” position
- Using recuperation correctly
- Heating and air conditioning.

I. Integrate eco-driving in the training of learners/novice drivers

106. Integrating eco-driving in driving education from the very start is the best possible way to ensure that more and more drivers – including private drivers, who are difficult to reach with eco-driving marketing efforts – follow eco-driving techniques in the long term. As a result, driving schools can be seen as the most important ambassadors for energy-efficient driving.

107. While eco-driving is already more or less part of the theoretical education in driving schools and a European directive has made eco-driving a mandatory element of the practical examination since 2013, the level of how eco-driving is taught in driving education differs largely between countries.

108. To establish a long-term co-operation with associations of driving schools and other important authorities responsible for driving education is essential for a successful national or regional eco-driving initiative. This should include train-the-trainer programmes for a large number of driving instructors, and possibly driving examiners as well.

109. Certification schemes to upskill driving schools to eco-driving schools should be developed. Such eco-driving schools should act as multipliers for eco-driving and sustainable mobility, for example, by providing skilled eco-driving personnel, a low emission vehicle fleet and encouraging alternative drives and sustainable mobility in driver education.

110. The benefits for driving schools which focus on eco-driving include – apart from less fuel consumption and less wear & tear for their instruction vehicles – certification and expertise as a promotional factor and competitive advantage, and licensed driver training as new business case.

111. Eco-driving should be integrated into the legislative framework for driving education and examination of learner drivers, including those related to passenger cars. Furthermore, learner driver education and examination procedures should be amended to incorporate the driving of electric vehicles equally to conventional vehicles. Examination procedures should be amended with regard to the EU regulation that restricts drivers to automatic vehicles if they pass their driving tests in electric vehicles.

105. Eco-driving should also be integrated into the professional driver qualification for truck and bus drivers.

112. The following conclusions and challenges have been identified in the EU-funded ECOWILL project regarding the successful integration of eco-driving into driving education:

- Eco-driving has to be a mandatory part of the practical examination
- Eco-driving knowledge has to be updated, standardised, and harmonised between instructors and examiners
- Guidance for a systematic implementation in teaching and testing is required
- Instructors need to be aware of didactical methods of conveying specific content to learner drivers.

III. THE PEP Policy Recommendations for Eco-driving

Annex of the Vienna declaration “Building forward better by transforming to new, clean, safe, healthy and inclusive mobility and transport”, adopted at the Fifth High-level Meeting on Transport, Health and Environment, held online in Vienna on 17 and 18 May 2021

113. Eco-driving facilitates the achievement of important objectives: improved traffic safety, reduced driving stress and greater comfort for drivers, smoother traffic flow and less congestion, lower fuel consumption and operating costs and lower carbon dioxide emissions and health risks. Eco-driving is a highly cost-effective measure contributing to greater energy efficiency and environmentally friendly and safer mobility and transport. One advantage of eco-driving is that it can also be practised on a voluntary basis and applied instantly by any driver without new equipment or devices.

114. The most important eco-driving recommendations are presented in THE PEP Guidelines on eco-driving, which were developed within THE PEP Partnership on eco-driving. Eco-driving should be established and mainstreamed as the smart and efficient driving style for all drivers, all vehicles and all traffic conditions.

115. To this end, it is suggested that national eco-driving initiatives be established based on THE PEP Guidelines on eco-driving. The following 10 core implementation steps are recommended in that regard:

(a) Following THE PEP Guidelines on eco-driving, platforms of national eco-driving experts and institutions relevant for eco-driving should be set up in Member States. Using such platforms, national eco-driving standards, handbooks and certification schemes for eco-driving trainers and eco-driving initiatives should be established;

(b) Driving trainers should be upskilled within the framework of THE PEP Partnership on eco-driving to create capacity for acting as eco-driving master trainers and eco-driving trainers, serving as a knowledge base for driving skills and driving education, as well as innovative vehicle technology. To share and generate knowledge, pilot seminars with fleet operators, facilitated by eco-driving experts from members of THE PEP Partnership on eco-driving, should be established and, if appropriate, used to upskill experienced driving trainers to become eco-driving master trainers;

(c) Following the train-the-trainer approach, the platform of eco-driving experts and eco-driving master trainers should establish courses to train a sufficient number of eco-driving trainers on standards and the contents of eco-driving courses. Such seminars should include theory and practice, an examination and, if appropriate, certification of eco-driving trainers;

(d) Furthermore, certification schemes to upskill driving schools to become eco-driving schools should be developed. Such eco-driving schools should act as multipliers for eco-driving and sustainable mobility, for example, by providing skilled eco-driving personnel and a low-emission vehicle fleet and by emphasizing alternative drives and sustainable mobility in driver education;

(e) Eco-driving should be integrated into the legislative framework for driving education and examination for learner drivers. Furthermore, learner driver education and examination procedures should be amended to incorporate the driving of electric vehicles and vehicles using alternative fuels and propulsion systems on an equal basis with conventional vehicles;

(f) Eco-driving training courses for licensed drivers should be delivered by experienced and qualified eco-driving driving trainers and must include driving on public roads and the use of monitoring devices that give direct feedback on fuel consumption. Eco-driving training courses for licensed drivers should follow a twofold approach: providing training for licensed drivers in general as well as for professional drivers of cars, buses and trucks. The effect of the training courses should be evaluated and monitored, in particular

regarding fuel consumption, carbon dioxide emissions and maintenance costs, to motivate more target groups to implement eco-driving;

(g) The roll-out of eco-driving initiatives should also be supported by awareness-raising campaigns and by the integration of eco-driving into the professional driver qualification for truck and bus drivers. It could also be addressed specifically to experienced drivers not having received eco-driving instruction since obtaining their driving licence;

(h) There should be a particular focus on eco-driving for electric vehicles as the best way to extend their range. Electric vehicle training should combine eco-driving with, in particular, the use of recuperation as well as effective charging;

(i) Eco-driving should be included in policies and strategies in order to ensure the sustainability of eco-driving initiatives;

(j) Eco-driving should be incorporated into national and international funding schemes in order to facilitate the establishment of eco-driving programmes, the exchange of know-how, the sharing of experiences and the further development of eco-driving techniques and training. Special emphasis should be placed in the future on the driving of electric and alternative vehicles, the freight and bus sector and the extension to further vehicle categories, such as railways, tractors and construction machinery. To this end, further cooperation between Member States should be intensified within THE PEP Partnership on eco-driving.
