

ACTUATE

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

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ACTUATE

- Safe eco-driving (i.e. correct vehicle handling) reduces energy consumption and optimise operational costs.
- 9 European partners (including five public transport operators and a bus manufacturer) develop, test and introduce safe eco-driving trainings for drivers of clean vehicles.
- Training concepts for professional drivers of different clean vehicle types (trolleybuses, hybrid buses, ebuses with "supercapacitors" and trams) will be developed, tested and evaluated.



ACTUATE will develop, test and introduce safe eco-driving trainings and seminar concepts for clean vehicle fleets of public transport operators.

Safe eco-driving has the potential to reduce energy consumption, emissions, operating costs and to increase passenger safety, but is so far only available for diesel-engine vehicles.

As **key benefits** information material on training and promotion campaigns for safe eco-driving will be provided. All outputs and results of the project – such as minimum training criteria, learning outcomes and training concepts/ materials – will help other public transport providers to educate and train their own drivers in safe eco-driving in a tried and tested manner.



ACTUATE – Project Partners



- **Barnimer Busgesellschaft mbH (BBG)**, Eberswalde, Germany
- **Dopravní podnik města Brna a.s., (DPMB)**, Brno, Czech Republic
- **Leipziger Aus- und Weiterbildungsbetriebe GmbH (LAB)**, Leipzig, Germany
- **Leipziger Verkehrsbetriebe GmbH (LVB)**, Leipzig, Germany
- **Rupprecht Consult – Forschung & Beratung GmbH (RC)**, Cologne, Germany
- **Salzburg AG für Energie, Verkehr u. Telekommunikation (SAG)**, Salzburg, Austria
- **Trasporti Pubblici Parma S.p.A. (TEP)**, Parma, Italy
- **TrolleyMotion (TM)**, Austria
- **Van Hool NV (VH)**, Lier, Belgium



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Objectives and Main Steps

- **Integrate ACTUATE trainings for safe eco-driving into formal bus driver qualification** of PT companies;
- *trainings in accordance with EU Directive 2003/59/EC* -
- **Enhance the quality of bus driver training** and expand the training to the **special requirements of clean vehicles**;
- *definition of minimum quality criteria & learning outcomes* -
- **Demonstrate the energy saving potentials** on the basis of capacity building in energy efficient driving of clean vehicles;
- *evaluation of training sessions with more than 1.500 drivers* -
- Upscale the outcomes for **wider up-take at European level**.
- *test of trainings at additional PT companies & “starter kits”* -



Definition of minimum quality criteria & learning outcomes

Developed according to learning outcomes:

- **Skills:**
E.g. „to be able to use hybrid bus drive train most efficiently when braking or accelerating”.
- **Knowledge:**
E.g. „about the ideal drive-cycle between stops incl. topographic conditions of local network/lines”.
- **Competencies:**
E.g. “to recuperate highest possible amount of energy in operation based on knowledge about topographic conditions”.

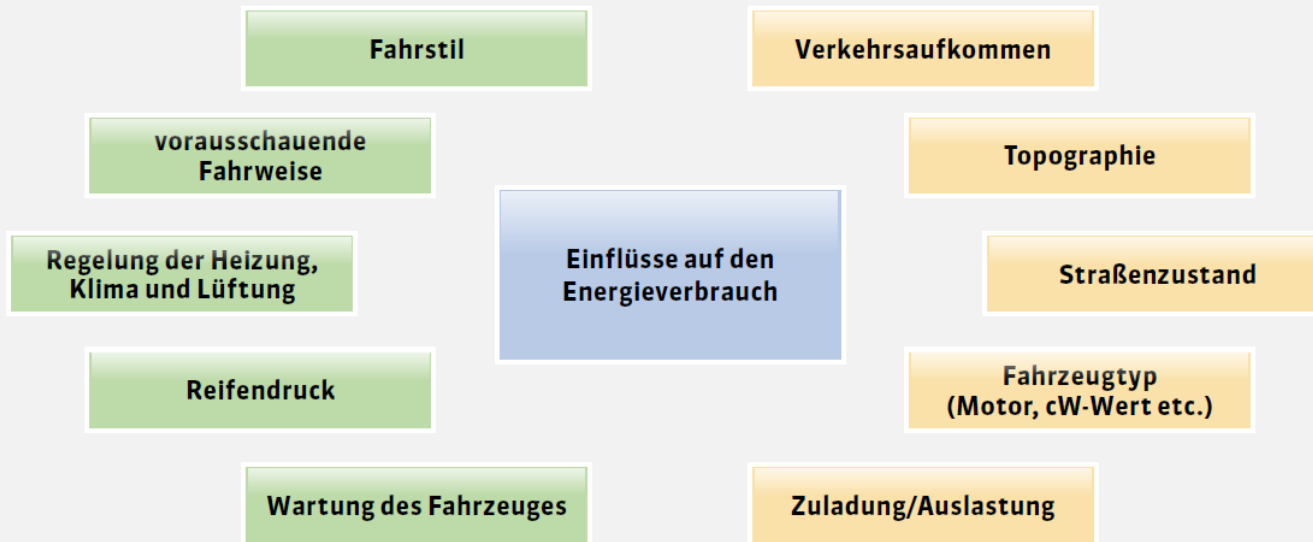
Basic requirements:

Requirements	Trainings shall maximise energy savings by eco driving
	Training material for safety aspects of clean vehicles
	Training material for specific bus types and tram control technology
	Pre-instruction and briefing of trainers and technical experts by bus and tram manufacturers about specifics of vehicle types
	Training only for drivers that are on duty on clean vehicles

Minimum 40% of training sessions should be realised as practical driving session!



What can be influenced by the driver? And what not!



e.g. Public Transport planning



Training programme evaluation

ACTUATE evaluation levels for safe eco-driving training programmes for clean vehicle drivers (according to Kirkpatrick's model 1994):

Level 1 -
Reaction

- Did they like it?

Level 2 -
Learning

- Did they learn it?

Level 3 -
Behaviour

- Did they use it?

Level 4 -
Results

- Did it impact the bottom line?

Level 5 -
ROI

- What is the Return on Investment?



Training programme evaluation



• Did they like it?

- **Measurement focus:** Drivers reaction and perception to/of trainings
- **Question(s) addressed:** What did drivers think of the safe eco-driving training programmes?
- **How do we measure that:** Questionnaires after training sessions
- **Results:** e.g. for trolleybus drivers training in Salzburg (273 drivers trained):
 - about 90% of all trained 1.574 tram and bus bus drivers rate the overall quality of the ACTUATE training as either 'excellent' or 'very good (especially the practical part of the trainings received very positive feedback by the drivers)
 - 89% rate the topic of safe eco-driving as 'very important' or 'important' for their daily work



Training programme evaluation



• Did they learn it?

- **Measurement focus:** Knowledge and skills gained by drivers
- **Question(s) addressed:** Was there an increase in knowledge and/or skill level of the trained drivers?
- **How do we measure that:** energy consumption measurements during trainings
- **Results:** e.g. for trolleybus (258, Salzburg) and hybrid bus (about 650, Leipzig) drivers trained:
 - about 75% per cent of trained hybrid and trolleybus drivers were able to cut down energy consumption by applying safe eco-driving techniques during training
 - E.g. 13% (up to 17%) reduction of diesel fuel consumption / 18% energy consumption reached by hybrid-/trolleybus drivers from Leipzig/Parma on average



Training programme evaluation



• Did they use it?

- **Measurement focus:** Worksite (the driver's workplace, line operation)
- **Question(s) addressed:** Is the new knowledge/skill being used on the job?
What effect did the training have on energy consumption of clean vehicles?
- **How do we measure that:** pre- and post-training energy consumption measurements, driving behaviour observation
- **Results:** e.g. measurements for trolleybuses in Brno (3 months before and after training) and tram operation (driving behaviour analysis during single days):
 - about 7,5% per cent energy consumption reduction by trained trolleybus drivers (10 drivers observed for long-term measurements) in Brno
 - Comparison of "driving curves" of single drivers in Leipzig



Level 4 –
Results

- Did it impact the bottom line?

Level 5 –
ROI

- What is the Return on Investment?

- **Measurement focus:** Business impact on organisation, return on investment
- **Question(s) addressed:** What effect did the training have on energy consumption of clean vehicles?; Return on Investment (RoI)?
- **How do we measure that:** Impact/RoI calculations etc.
- **Results:**
 - Assuming the “realistic” scenario of 3% energy consumption reduction; this would lead to **annual budgetary savings of 210.000 EURO for tram operation** in Leipzig (ca. 7 Mio. EURO annual cost for traction current; 420.000)



Level 4 –
Results

- Did it impact the bottom line?

Level 5 –
ROI

- What is the Return on Investment?

- **Results:**

- Assess further (monetary) benefits of the trainings incl. the **reduction of abrasion** effects on clean vehicles (which have high unit cost) & on needed infrastructure in case of trolleybus/tram systems, **reduced status of drivers' illness** due to less stress etc.
- Assuming the “realistic” scenario of 3% energy consumption reduction; primary **energy savings of about 4.700 tons** of oil equivalent and **25.000 tons of CO₂** reduction could be reached **by 2020 for the clean vehicle fleets of the ACTUATE partners**



Motivational in-house campaigns:

- To support the introduction of safe eco-driving trainings and to motivate drivers to apply and retain their newly acquired eco-driving skills and knowledge
- Comparison of different approaches:
 - bonus schemes (still to be decided for Leipzig)
 - competitive schemes
 - image campaign schemes



In-house & public campaign in Parma

i nostri autisti hanno
il piede ecologico



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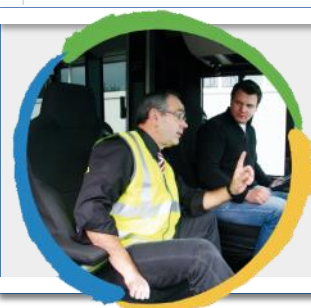
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How can you benefit from ACTUATE?

- Training materials (concept, presentation & brochure for safe eco-driving training available for:
 - Tram (LVB & LAB)
 - Hybrid bus (LVB & LAB)
 - Trolleybus (Salzburg AG) und
- Download of a „Starter-Kit“ for eco-driving of clean vehicles (coming soon)
- Download of „in-house“ campaign elements
- Lessons Learnt brochure with main project findings for training introduction, implementation and evaluation
- www.actuate-ecodriving.eu

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