

**CUTE Congress in Hamburg,
May 10th/11th 2006**



**HAMBURG KOMMT AN
MIT WASSERSTOFF!**

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Technology

Education

Training

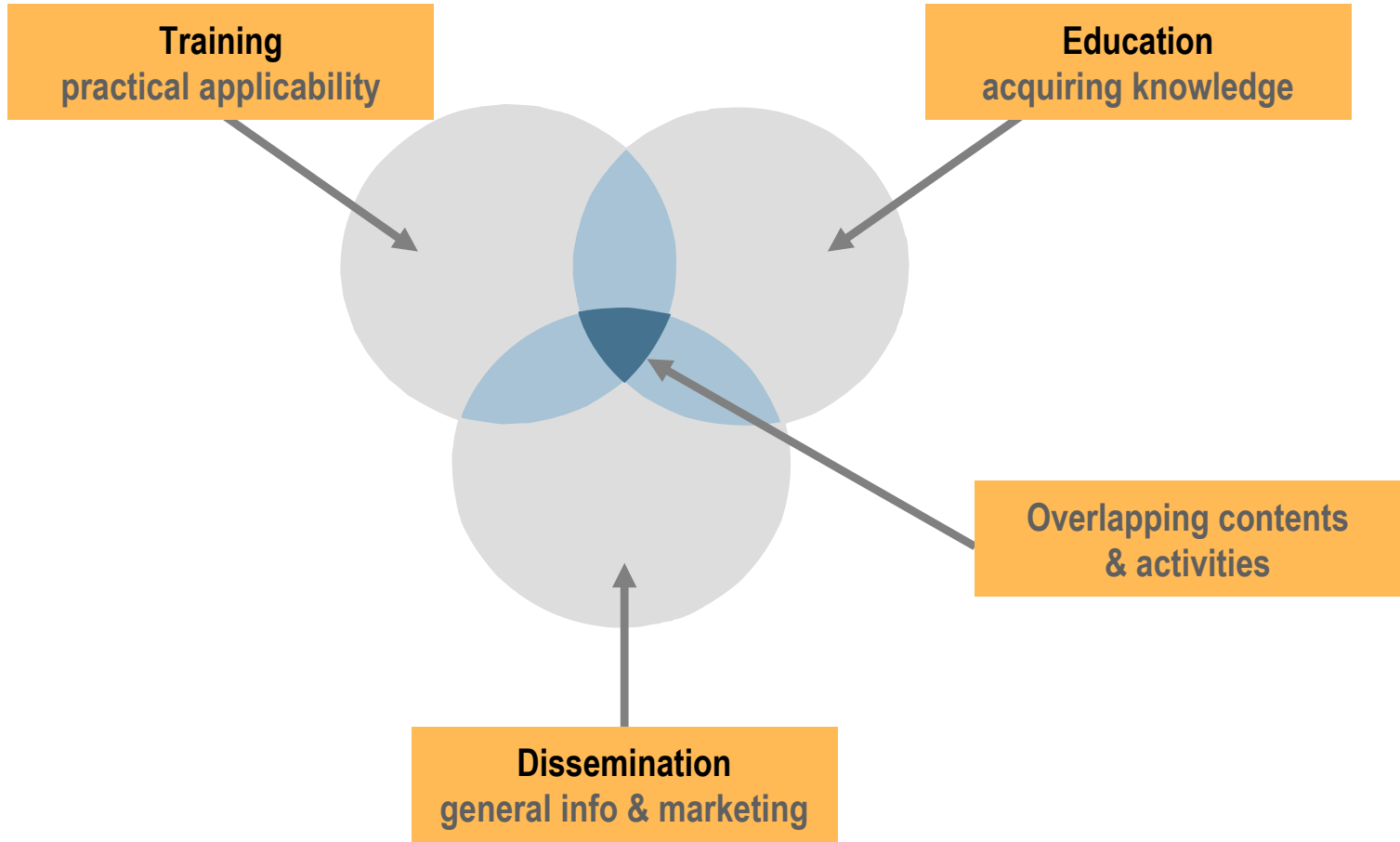


Staff

Public

Deliverable 4 Training and Education – the human part in CUTE

- analysis of the training of the fuel cell bus drivers, the technicians of the filling stations and site technicians from EvoBus/Ballard Power Systems
- analysis of education activities
- recommendations for future activities in training and education



Training

execution of a systematic programme or a variety of scheduled exercises in order to develop and enhance skills, knowledge, capabilities and productive efficiency

Education

- the gradual process of acquiring knowledge
- puts an emphasis on imparting knowledge, in this context especially how the fuel cell functions
- mainly refers to activities focussing on pupils and students as the primary target group

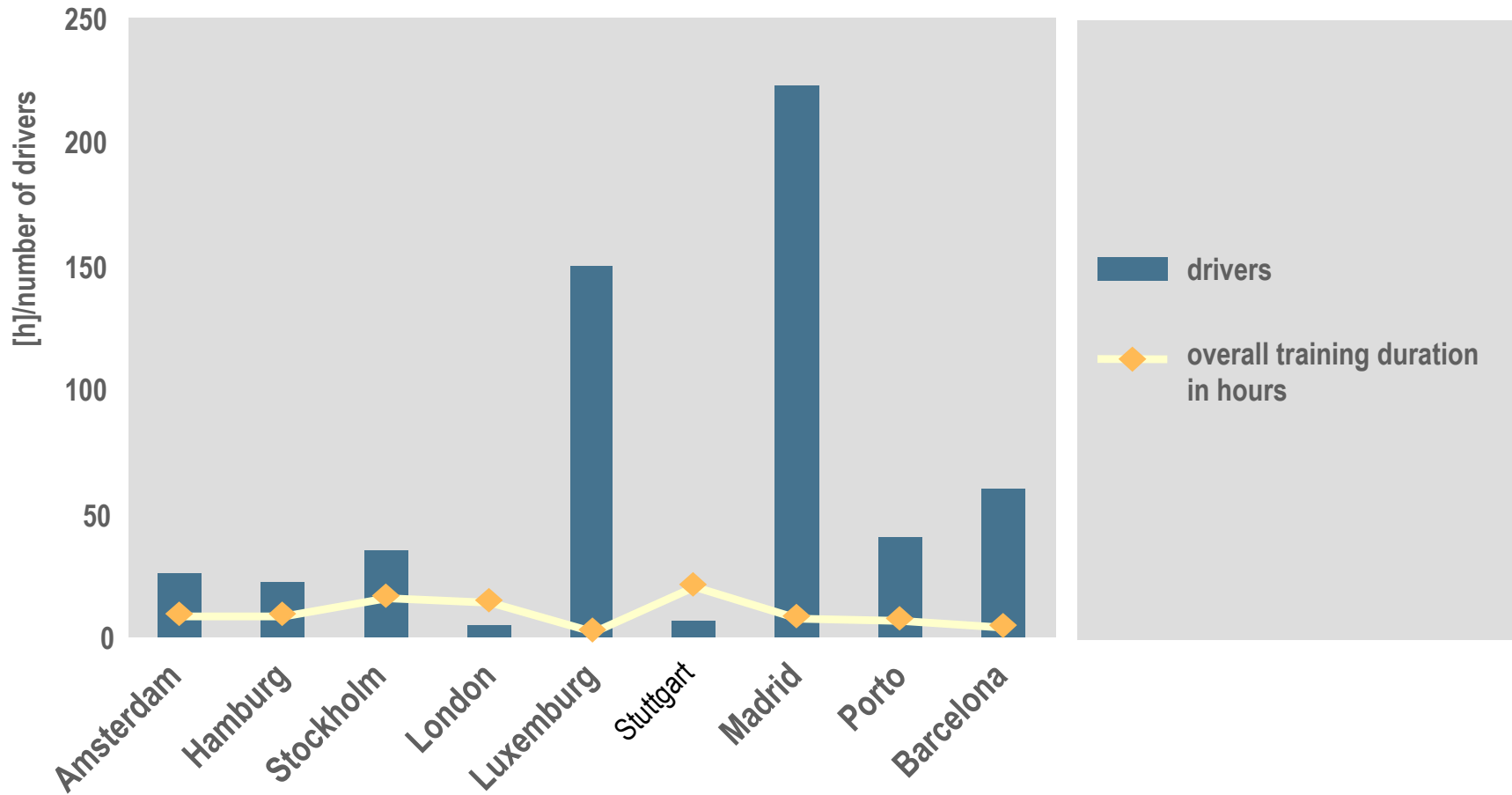
- How was the training needs analysis performed, in order to find out, who needs to be trained and for how long?
- Who developed the training materials, and who performed the training sessions?
- How did the execution of the training take place?
- Which experiences could be collected from that training?
- Has educational material been readily available?



- Most of the staff was recruited on a voluntary basis
- The staff had been recruited from the existing pool

Selection of recruitment criteria:

- active interest in new technologies (site technicians)
- good communication skills with enthusiasm in explaining the new technology and the project to interested people (drivers)
- Teamwork (filling stations)



- Train the trainer-principle, frontal and practical
- Training materials for the drivers were provided from Ballard/EvoBus in the local language
- Additional training of drivers only necessary in Hamburg (driver had to learn how to fill up the buses) and Stockholm (new driver were recruited)

The theoretical part on hydrogen and safety:

- Introduction
- What is a fuel cell?
- Hydrogen Gas Characteristics
- The Fuel Cell Bus
- Safety
- Hydrogen
- Fire
- Collision
- Pressure Relief Devices
- Reduced Power Mode
- Emergency Switches

The practical part:

- Driving and Maintenance Procedures
- Start-up
- Driving
- Failure Indication Interface
- Parking and Shutdown
- Fuelling
- Fuel Cell Bus Systems
- Different service schedules (daily, 80h)
- General warning
- Filling
- Coupling of the trailers for the hydrogen backup-supply
- Control courses
- Emergency cases

- Training materials and manuals delivered by station supplier
- The **first course** (four hours) for staff working with the filling stations in Stockholm, covered
 - general information on hydrogen,
 - the fuel cell and the fuel cell bus,
 - well as the CITARO buses (Mercedes),
 - refuelling facilities and
 - service premises.

The contents of the **second course** :

- general safety regulations,
- the interface in between instrumentation and user,
- and the handling of error- and disruption messages.

The **final course** (eight hours):

- general gas knowledge,
- general safety regulations,
- review of reporting routines,
- review of refuelling equipment,
- review of vehicle equipment,
- review of safety equipment,
- trouble shooting and practice.

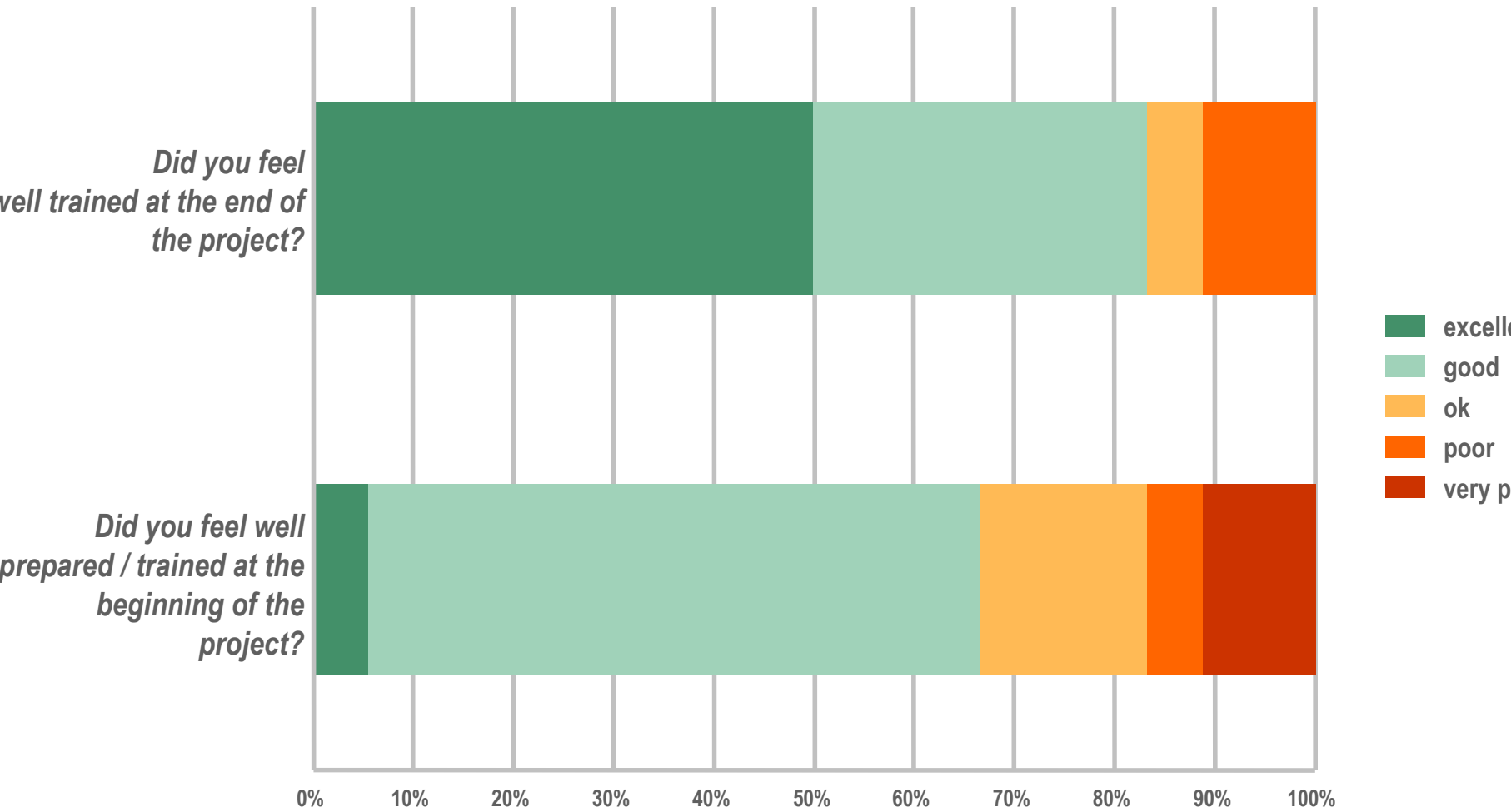
Ballard Fuel Cell Engines:

- E-Learning Fuel Cell introductory course to provide an overview of
- PEM fuel cells and PEM fuel cell systems,
 - hydrogen production,
 - hydrogen storage,
 - - onboard reforming technologies,
 - - and hydrogen safety for fuel cell systems.

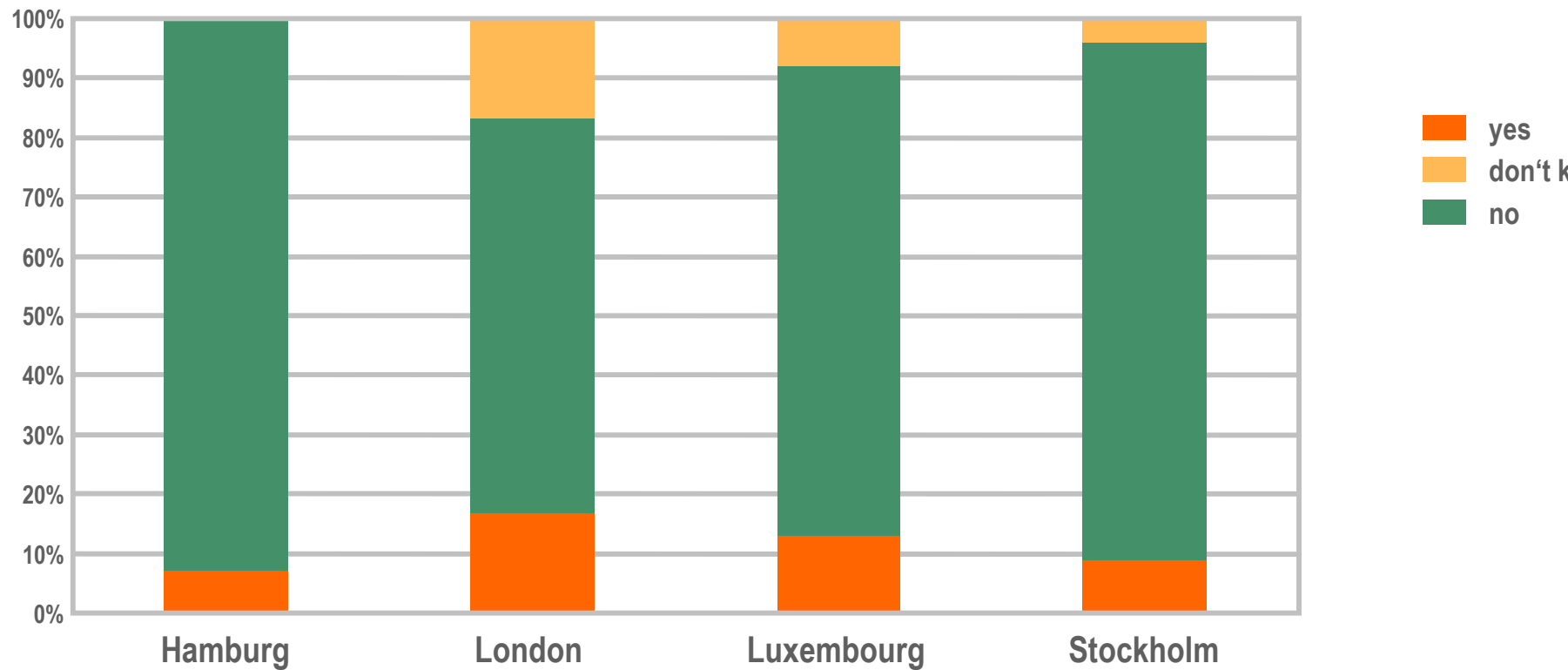
Heavy Duty System Technician Training:

5week instructor lead, classroom/lab environment course provides a detailed understanding of the heavy-duty bus system and its maintenance.

Evaluation of training by site technicians



Do fuel cell buses present additional risks compared to standard diesel buses?



- recruit the personnel on a voluntary basis
- additional staff for bus maintenance
- recruit a small number of staff
- training needs analysis

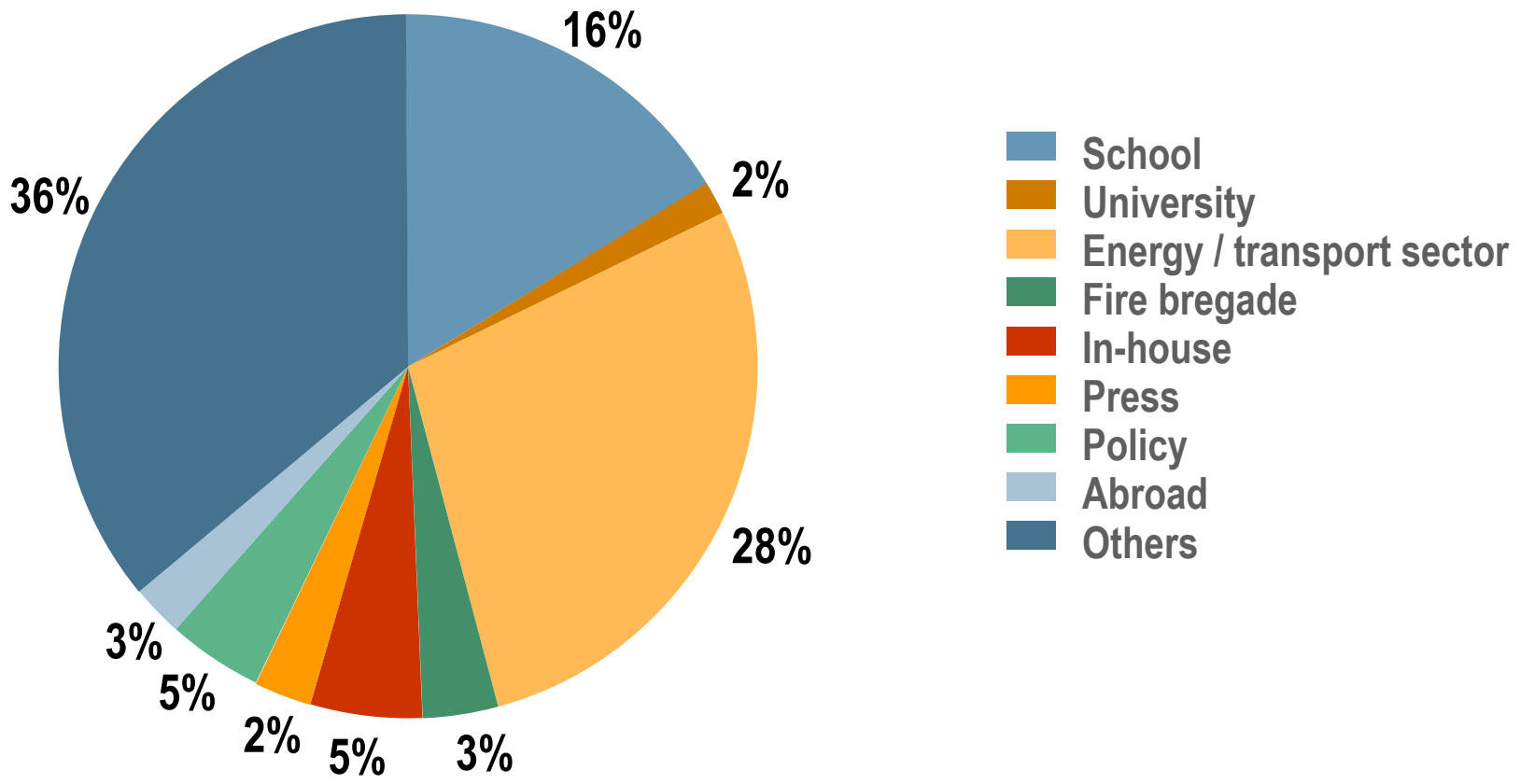
- Develop short and practical documents tailor made for drivers
- Combine Verbal explanations and introductions at the bus itself with the possibility to ask site technicians
- develop an uniform European Certificate for bus drivers and other staff handling fuel cell technology
- Document feedback systematically

- Training manuals and handbooks need to be designed in a way that allow them to be developed further and amended
- Manuals should include all possible alarms of filling stations
- Tabletop emergency response drills should be made use of in the training

- School file with enclosed CD, 500 produced and distributed
- CD, additional 100 produced
- Film for schools, 50 videos produced, CDs in response to individual requests



- Invitation to guided visitor tours on bus depot site



- meetings in between SSB and small groups of pupils to give information on the fuel cell technology and on the CUTE-project
- Preparation of short lectures of roughly ten minutes by the pupil-trainer
- Visit of school yard

- web-based, interactive program (which includes teacher and student resource material) designed for mid-to-upper primary school students (ages 9-13 years)
- Two different and separate activity and learning packages are available on the web site www.gdc.asn.au/ecobus.
- By January 2006, the education site has received 6,612 hits since it had been launched.

Year	Page Loads	Unique Visitors	First Time Visitors	Returning Visitors
2005	6,613	1,965	1,68	285
2006	110	51	45	6

- a close co-operation with all relevant stakeholders will be beneficial for the development of the education materials
- schooling “outside the classroom”
- References in the education materials should indicate other options for educational activities
- collection of feedback



Thank You for Your Attention!