Bus and coach transport for greening mobility

Contribution to the European Bus and Coach Forum 2011

Huib van Essen, 20 October 2011
The great challenge of decarbonizing transport requires low-carbon technology and decoupling.
Environmental performance of transport modes: how to compare?

- Types of impacts:
  - Emissions: CO$_2$ (climate change), NO$_x$, PM (air quality)
  - Other environmental impacts: noise, upstream emissions
  - Other socio-economic impacts: accidents and congestion

- Fair comparisons require:
  - Well-to-wheel approach
  - Real life emission factors
  - Door-to-door
  - Detour factors
  - Realistic occupancy rates and empty driving
GHG emissions - short distance transport

CO2 (g/pass-km); short range; day average; 2010

- Average util.
- 1 pass.
- 2 pass. = 3 pass.
- 4 pass.
GHG emissions - long distance transport

![Graph showing CO2 emissions per passenger-km for various modes of transport.]

- Car (petrol)
- Car (diesel)
- Car (LPG)
- Coach
- IC train (electric)
- High speed train
- Aircraft (463 km)
- Aircraft (1389 km)
- Aircraft (2778 km)

- Average util. 1 pass. 2 pass. 3 pass. 4 pass. CO2-eq
Comparison of modes and future trends

- Occupancy rates decisive
- CO₂ reduction for bus & coach:
  - Short term limited, but coaches still among best-in-class
  - Longer term options: fuel efficiency, low carbon energy, logistics
- Air pollutant emission relatively high; will improve with Euro-VI
- Competing modes improve their emission performance:
  - Euro standards
  - CO₂ standards for cars
  - Decarbonization of electricity
White Paper on Transport 2011: objectives

- 60% GHG reduction in 2050 compared to 1990 (overall: 80-95%)
- No conventional cars in urban areas in 2050; -/-50% in 2030
- Passenger transport over medium distance (<1000 km) mainly by rail
- 40% sustainable low-carbon fuels for aviation in 2050
- Road accident fatalities to zero in 2050
- Full application of user/polluter pays principles (internalisation of external costs)
White Paper on Transport 2011: assessment

- Modal shift is a target but not significant in impact assessment
- Decoupling transport growth from GDP: not a target but assumed in impact assessment
- Not much attention for bus and coach
- No clear vision on their contribution to long-term objectives (in contrast to rail transport)
Potential of bus and coach transport for greening transport

Bus and particularly coach transport have important advantages:

- Flexible modes of transport; door-to-door
- Low external and infrastructure costs (2 to 4 times lower than cars per passenger)

Main challenges:

- Many practical improvements, e.g. infrastructure, ticketing, marketing, ICT, service levels, etc.
- Increase of load factors (particularly for public transport buses)
- Further decarbonization required to stay among best-in-class
- Not much attention from policy makers: no long-term vision
Elements of a policy framework

Generic instruments:
- Harmonized fuel and carbon taxes, ETS, road pricing

Stimulation of bus and coach transport:
- Infrastructure such as bus/coach lanes, P+R, terminals
- Opening of intercity coach markets
- Improving regulation regarding driving times and rest periods
- Harmonization of VAT rates across all modes
- Promotion of collective transport modes

Policy instruments aimed at passenger cars:
- Parking policies, congestion pricing and taxation
- Harmonization of speed policy (e.g. motorway speeds of 90-100 km/h)
- Car-free and environmental zones

Policies for improving the environmental performance of bus and coach
Main conclusions and recommendations

- **Coach:**
  - Lowest CO₂ emissions of all long distance modes (with E-trains)
  - Competitive pollutant emissions

- **Public transport buses:**
  - CO₂ emissions lower than cars
  - Relatively high pollutant emissions

- **Further decarbonization and emission reductions needed**
- **Bus and coach have potential to contribute to White Paper targets**
- **No clear vision on collective bus and coach transport in White Paper**

- **Development of a clear ambitious realistic vision on the role of bus and coach in the future of transport Europe needed**
Questions?
Pollutant ($\text{NO}_x$) emissions - short distance

![Graph showing NOx emissions for different transport modes.](image)

- **Car (petrol)**
- **Car (diesel)**
- **Car (LPG)**
- **Moped**
- **Motorcycle**
- **City bus**
- **Regional bus**
- **Tram**
- **Metro**
- **Reg. train (elec.)**
- **Reg. train (diesel)**
- **IC train (elec.)**

- **Average util.**
- **1 pass.**
- **2 pass.**
- **3 pass.**
- **4 pass.**
Pollutant ($\text{NO}_x$) emissions - long distance

![Diagram showing NOx emissions per passenger-km for various modes of transport, including car (petrol), car (diesel), car (LPG), coach, IC train (electric), high-speed train, aircraft (463 km), aircraft (1389 km), and aircraft (2778 km). The diagram also shows average utilization and different passenger loads.]
Options for decarbonizing buses and coaches

Improving energy efficiency of conventional vehicles:
- Engine and transmission, including hybridization (city buses)
- Aerodynamics and Rolling resistance of tyres
- Eco-driving

Shift to alternative energy carriers:
- Gas (LNG, CNG, Bio-gas)
- Bio-fuels
- Electricity
- Hydrogen

Logistic optimizations (higher occupancy rates)