Hydrogen driven Fuel Cell Buses in Public Transport in Luxembourg (L)

General Information
Within 2 EU funded projects 3 fuel cell buses have been in use in daily public transport service in the city of Luxembourg. Service was provided from October 2003 to October 2005 with grants of the CUTE-project. The good experiences within CUTE led to its follow up project HYFLEET:CUTE bringing the buses back on the road from January 2006 until January 2007. After the end of the test operation, one bus was transferred to the Luxembourg tram and bus museum, 2 were returned to the manufacturer. The filling station was put into stand by mode so that it can be reactivated for future use.

Results
- Fuel cell technology is locally emission free and the electric traction emits less noise compared to a bus with combustion engine reducing unhealthy impact on cities population and contributing to quality of life.
- Each bus was in use for approx. 5,000 operating hours and 80,000 km driven, the highest operating performance of all vehicles used in the projects. This was due to optimised organisation, e.g. well trained and engaged engineers, a large pool of voluntary drivers (making sure, that driver’s rosters complied with bus availability), localisation of the garage or optimised low downtime for refilling.
- Compared to other prototypes the vehicles showed a good reliability, similar to conventional buses in Luxembourg public transport.
- Fuel consumption amounted to some 20 to 21 kg H₂ per 100 km, comparable to 66 to 68 l/100 km. Comparable Euro 4 or EEV diesel buses in the City of Luxembourg have a consumption of about 50 l/100 km, partly due to 2 tons higher empty weight of the H₂-vehicle.
- Drivers were extremely happy with the buses (probably also due to a lot of information on the whole project given to them before the project started). Main areas of satisfaction were the smoothness of operation, the reduced noise, etc. The same reactions were noted with the passengers, also due to the same reasons.
Applicability

- Filled up the buses had a range of 200 km. This is insufficient for continuous operation in daily public transport service. It was compensated by locating the filling station near the ends of a few routes, losing no time for refuelling once a day in the middle of the afternoon.
- The main purpose of the project was to test the concept.

H₂ Bus Project in Luxembourg (some information in French, German and English):
http://www.vdl.lu/Environnement+et+mobilit%C3%A9/Autobus/Mus%C3%A9e+des+tramways+et+de+bus/HyFLEET_CUTE+Bus+%C3%A0+pile+%C3%A0+combustible-highlight-hydrogen.html

H₂ bus project sites of some other cities involved
Amsterdam (in Dutch):
http://www.gvb.nl/overgvb/projecten/brandstofcelbus/Pages/brandstofcelbus.aspx
Hamburg (in German, some information in English):
http://www.hh2wasserstoff.de/CUTE/HH2/index.html and (in German):
http://www.hochbahn.de/_ZopeId/34850094A3yQaVgE0Ig/Hochbahn/Unternehmen/UeberUns/Oekologie/Spezial_1/index.html
London (in English):

HyFLEET:CUTE Hydrogen for Transport Project, Project website (in English):
http://www.global-hydrogen-bus-platform.com/

HyApproval - Handbook for Approval of Hydrogen Refuelling Stations (in English):
http://www.hyapproval.org/

Musée de Tramways et de Bus de la Ville de Luxembourg (Luxembourg tram and bus museum, in French, English and German):
http://www.rail.lu/tramsmusee.html