Stuttgart stakes sustainable future on diesel-hybrid buses

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The Germans have a reputation for thoroughness and efficiency. Judging by the sustainable public transport study carried out by SSB, the public transport company for Stuttgart, that reputation is well deserved.

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Between 2006 and autumn 2007, in partnership with PE Europe, the sustainability consulting arm of business consultancy PE International, SSB carried out an in-depth study of the different options for Stuttgart in sustainable bus transport up to 2020.

Life cycle approach

But rather than simply looking at the different options in sustainable buses and seeing which was the cheapest to run in terms of running costs and reduced emissions, the exhaustive analysis took into account not only the running costs and emissions (CO2, NOx, particulate matter and hydrocarbons) of the buses themselves, based on the specific requirements of the Stuttgart bus network, but also the economic environmental impact of the fuel used – from extraction, through production, operation and disposal - and the economic and environmental impact of producing the buses – from extracting the raw materials, manufacturing the buses, operating them and then disposing of them at the end of their life cycle.

Scenarios

The study analysed five different scenarios:

1. Basic diesel scenario: all existing buses (which currently meet Euro 3 emissions standards) are gradually replaced by diesel buses meeting Euro 5 emissions standards and fitted with diesel particulate filters and de-NOx filters.

2. Diesel scenario 1: the current fleet of Euro 3 with particulate filter buses are upgraded to combination diesel particulate filters and de-NOx filters by 2009, and retired buses replaced by Euro 5 standard buses from 2007.

3. Diesel hybrid scenario 2: as diesel scenario 1, but after 2010 all retiring buses would be replaced by diesel hybrid Euro 5 buses.

4. CNG scenario 3: as with diesel scenario 1, but all retired buses are replaced by CNG buses from 2007, from 2007 to 2010 by CNG Euro 5, and from 2011 by the CNG hybrid.

5. Fuel cell scenario 4: as with diesel scenario 1, but all retired buses replaced by diesel buses until 2010; and from 2011 by fuel cell hybrid buses.

All the scenarios were analysed using the same test data relating specifically to Stuttgart's public transport system. As well as the obvious financial differences between the different buses and scenarios, the following environmental assessments were carried out:

- Particulate Matter (PM) emissions
- Nitrogen Oxide (NOx) emissions
- CO2 emissions
- Hydrocarbon emissions
- Energy consumption

And the winner is...

Perhaps surprisingly, it was the diesel hybrid scenario that proved to be the most financially and environmentally effective. Although the bus itself was not the most operationally efficient in several of the tests, when the whole lifecycle of the bus and the fuel is taken into account, it was clearly the best option, delivering a 25% reduction in energy costs, enough to convince SSB to start planning for diesel hybrid future.