



**clean fleets**  
purchasing clean public vehicles

# CLEAN BUSES: CITY EXPERIENCES WITH FUEL AND TECHNOLOGY OPTIONS

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ICLEI – LOCAL GOVERNMENTS FOR SUSTAINABILITY





## CLEAN FLEETS PROJECT : ASSISTANCE & SUPPORT

- **Guide** on clean vehicle procurement & the CVD
- Development of **training** package
- 2 **Train-the-trainer** seminars
  - Sofia – 16 May 2014
  - Rome – 11 June 2014
- Offer of direct advice and **assistance in tendering**
- **Helpdesk** on clean vehicle procurement



## EXCHANGE

- European and national workshops
  - London 25-26 March,
  - Stockholm (May 2014) Rotterdam (October 2014)
- Case study series
- Discussion Group [www.procurement-forum.eu](http://www.procurement-forum.eu)
- Thematic working groups
  - Life cycle costing
  - Bus technology options → Clean buses report



- Public authorities and transport operators from around Europe
- 100+ experiences
- 17 fuel & technology types:
  - Associated costs
  - Market availability
  - Environmental performance

## Clean Buses – Experiences with Fuel and Technology Options

February 2014





Bus type	CIVITAS WIKI Policy Analysis	Clean Fleets Experiences
Diesel Euro VI	<p>*Currently most economical.</p> <p>*Very low pollutant &amp; GHG emissions.</p>	<p>√ Many authorities now planning. Little practical experience yet.</p>
Natural gas	<p>*Readily available.</p> <p>*Costs are higher than diesel buses.</p> <p>*Pollutant emission advantages have diminished with Euro VI introduced.</p>	<p>√ Mature market.</p> <p>√ but lower than alternative fuel/tech options.</p> <p>√ and WTW GHG emissions not significantly better</p> <p>+ Some safety concerns</p>



Bus type	CIVITAS WIKI Analysis	Clean Fleets Experiences
Biofuels	<p>*Comparable cost to diesel buses.</p> <p>*Pollutants &amp; GHG emissions depend on type of biofuel &amp; blend ratio</p> <p>* GHG likely to be lower than diesel</p>	<p>√ but depends on local market conditions and supply chain (HVO &amp; BTL limited supply) + Costs tend to be too high for bioethanol</p> <p>√ e.g. FAME GHG emissions lower, more for <b>waste</b> oil, less for <b>palm</b> oil</p> <p>√ e.g. HVO GHG emissions lower, more so for <b>sunflower</b> less so for <b>soybean</b>.</p> <p>+ biogas PM almost zero, but difference in NOx emissions now less (Euro VI)</p> <p>√ significantly so for biogas, less significant for FAME or HVO</p> <p>+Good biogas experiences= Sweden, UK, Finland +Good FAME experiences = Stockholm, Burgos +Negative FAME = Rotterdam, Dublin and Graz did a massive U-turn to EEV and Euro VI +Fairly good HVO experience = Helsinki &amp; London</p>



# A Fleet of Biomethane Buses in Reading, UK

## Clean Fleets case study

- 20 certified biomethane EEV buses
- Lower life cycle costs
- 30-50% less NOx emissions than comparable Euro V diesel buses





Bus type	CIVITAS WIKI Policy Analysis	Clean Fleets Experiences
Hybrids	<p>*Slightly higher costs, but now reducing.</p> <p>*Can reduce GHG emissions up to 20%</p>	<p>→ Can be up to 50% more cost</p> <p>→ Can be up to 30% less depending on duty cycle, topography, driver etc. Examples include London and Birmingham (UK)</p> <p>+ Positive experiences in London &amp; Reading(UK), Helsinki (FI), Hannover &amp; Dordrecht (DE), Rotterdam (NL), Nantes &amp; Angers (FR)</p> <p>+ Mixed experiences in Munich &amp; Leipzig (fuel consumption higher)</p> <p>+ Negative experiences (older models)</p>





## The New Bus for London – Diesel/electric hybrid

### Clean Fleets case study

- First bus specifically designed for London in over 50 years.
- Iconic design combined with modern hybrid technology and expectations.
- Emits less than half the CO<sub>2</sub> and NO<sub>x</sub> than a current London diesel bus in service
- Largest order of hybrid buses ever placed in Europe.





Bus type	CIVITAS WIKI Policy Analysis	Clean Fleets Experiences
Full electric	<p>*One of the more expensive - high investment costs in infrastructure.</p> <p>*Becoming commercially available.</p> <p>*One of most environmental options.</p> <p>*Driving range and costs of batteries are still an issue.</p>	<p>✓ but depends on how it will be used.</p> <p>✓ Now in operation in Vienna (AT) and under trial in Gaia (PT), Umea (SE), Bremen (DE), Copenhagen (DK) and London (UK), but the market is still not mature</p> <p>✓ zero tailpipe &amp; noise, but WTW GHGs depend on electricity source.</p> <p>✓ need for charging can limit flexibility.</p>



## Innovative Electric Buses in Vienna

### Clean Fleets case study

- 12 electric microbuses purchased for the city centre
- New technology: batteries charged through tram's overhead power lines at end stations
- Pre-procurement test phase with four buses







Bus type	CIVITAS WIKI Policy Analysis	Clean Fleets Experiences
Hydrogen fuel cell	<p>*Very expensive &amp; high investment costs in infrastructure.</p> <p>* It is a promising option</p> <p>*But still in an experimental stage.</p>	<p>√ including acquisition, infrastructure and maintenance. + EU-funded projects have helped</p> <p>√ WTW GHG depends on production methods, can be up to 100%. Have shown good performance in trials, with high route flexibility.</p> <p>√ Low production numbers</p> <p>+ Positive experiences of full H2 in London, Cologne and Oslo</p> <p>+ Positive trials in many EU cities</p> <p>+ Positive trials of H2 Hybrids in Oslo, Hamburg, Antwerp, Cologne, Amsterdam.</p>



## CONCLUSIONS

- Both the CIVITAS WIKI and the Clean Fleets publications demonstrate that there is an increasingly wide range of viable bus options available, each with strengths and weaknesses.
- Choice will depend on a number of factors:
  - Financial capacity and support, including tax incentives and grants
  - The extent to which total cost of ownership is taken into account
  - Prioritisation of air pollution and GHG emissions
  - Availability of fuel and refuelling or recharging infrastructure
  - Topography, route conditions and climate
  - Fleet management and replacement strategies



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The Clean Fleets project assists public authorities and fleet operators with the implementation of the [Clean Vehicles Directive](#) and the procurement or leasing of clean and energy-efficient vehicles.

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**EVENTS**

11-12 December 2013  
**WORKSHOP: CLEAN BUS PROCUREMENT**

Bremen | Germany

The first Clean Fleets European workshop will focus on the procurement of clean buses under the Clean Vehicles Directive (CVD). [Read more.](#)

**PROCUREMENT ADVICE**

TENDER SUPPORT



Wednesday February 26th, 2014 BETA 10 Logged in as [Natalie Evans](#) [Sign Out](#) [About](#) [Contact](#)



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**Discussion group: Clean vehicle procurement**

A place to exchange experiences, knowledge and opinions about the procurement of "clean" vehicles for public fleets.

The group is co-ordinated by the Clean Fleets project - [www.clean-fleets.eu](http://www.clean-fleets.eu)

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 [clean-buses-experiences-with-fuel-and-technology-options.pdf](#) (910.54 KB)

Attached to the discussion Clean Buses: Experiences with Fuel and Technology Options by [Natalie Evans](#) on February 24th 2014 at 10:54

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 **Life cycle costing - How common is it?** Edit Delete

The topic of life cycle costing (LCC) crops up again and again when discussing the procurement of clean vehicles - it seems obvious that you should also take the running costs of a vehicle (fuel, spare parts, maintenance) into account when you buy/lease a vehicle, as well as the purchase price. But is this really the case, or do many public authorities and transport operators still only consider the purchase price?

Is LCC normal for public vehicle procurement in your country?

1 comment [Comment](#) 0

[Natalie Evans](#), 15 hours ago

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