

## Reforming the public fleet - Electric and CNG vehicles in Ghent

### Clean Fleets case study

- 4 year framework contracts for electric and CNG cars and light delivery vehicles
- 100% of Ghent's electricity comes from renewable sources
- Estimated volume over the duration of the contract: 94 electric vehicles and 36 CNG vehicles
- Close involvement of end users in market consultation and testing phases



Renault Kangoo ZE (electric vehicle)<sup>1</sup>



CNG Fiat Ducato vehicles

### Contract tendered

- Two four-year framework contracts for passenger and freight vehicles tendered in September 2012, one for electric and one for CNG driven vehicles
- Tenders published by the Department of Facility Management, Services and Logistics Division, of the City of Ghent on behalf of various city and other local public entities

### Targets and planning considerations

The City of Ghent administration has a stated policy to be CO<sub>2</sub>-neutral by 2050, with the promotion of sustainable urban mobility a key focus. Within this framework the city is committed to introducing environmentally friendly vehicles into the public fleet to help drive market development, and to encourage the uptake of these vehicles amongst the general public.

An extensive market research and testing phase was undertaken within the [CIVITAS ELAN project](#) – for electric vehicles this testing phase covered almost all the vehicles then available on the market. Eventually it was decided to publish framework tenders for electric and CNG passenger and freight vehicles. Both technologies are commercially available and allow for different transport needs within the organisation to be covered. The city did not opt for too many different technologies to avoid problems related to infrastructure needs, fuel availability and organisational hurdles.

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<sup>1</sup> Images copyright City of Ghent



## Procurement approach

The framework contracts were awarded through an open tendering procedure by the Facilities Management Department of Ghent's Services and Logistics division. The contract was also opened up to other public entities in and around Ghent to offer the advantages of such a large contract, and further encourage the spread of the new vehicle technologies.

One of the most challenging factors in introducing new technologies is resistance to change by users. To overcome this, Services and Logistics involved other city departments and drivers in the market research and test drives. After awarding the contracts, driver lessons, information days and follow-up feedback sessions with drivers were also organised to illustrate the advantages of the new technologies.

When a Ghent city department orders new vehicles, it must indicate the purpose of the vehicle (e.g. transport of goods, passenger transport or a mix of both). The Services and Logistics Department then identifies and recommends the most suitable vehicle from the framework contracts. Suitability is determined through factors such as general usage pattern, number of passengers, mileage, budget availability etc. This may also include purchasing through other existing vehicle contracts if required. To ensure that the departments which order electric vehicles will be able to charge them, the Services and Logistics department of Ghent also ordered a charging station (slow) or a simple plug (normal wall socket) with every electric vehicle. For CNG, Ghent also needed to build new infrastructure. Since there was no fuel station offering CNG, the Services and Logistics department opted to install a slow fill station at one of the new vehicle depots for the infrastructure and road construction department. In the future, the city wants to further encourage the introduction of CNG within its own fleet and other public organisations as well as the private sector. Therefore filling infrastructure will be needed in the region and will need to also be open to the private sector and citizens.

## Clean Vehicle Directive (CVD) Methodology

In awarding both tenders, methodologies 1 and 2 of the Clean Vehicle Directive, technical specifications and award criteria, were used.

1) Technical specifications included (full specifications available on request):

### Electric vehicles

- Maximum charging time: 12 hours.
- Suppliers are asked to provide the latest model offered on the market
- Battery life is at least 120 km in eco mode.
- Possibility of interim recharging with a duration of 1 hour
- Electric motor of at least 40 kW that is able to independently run the vehicle/engine.
- Warranty on the battery pack for at least four years or 1500 cycles.

### CNG driven vehicles

- Main fuel is natural gas, with possible conversion to biogas
- Minimum Euro V emissions standard
- Gas tank capacity of at least 190 litres
- Reserve fuel tank (minimum 12 litres), which can take over (automatically or manually) when the gas tank is empty
- Silent and energy efficient radial tyres with a normal road profile.



- Warranty of at least 4 years.

## 2) Award criteria:

### **Electric vehicles**

Award criteria were price (60%) and quality (40%) for electric vehicles. Extensive market research indicated that there are still very big issues about the batteries. Therefore quality was given a high weighting in the evaluation.

- 60% price – calculation:
  - Purchase price of a base vehicle equipped with all required options
  - + Average cost of maintenance and repair contract
  - Value of a spare battery
  - Average redemption amount after eight years at 5,000 km, 10,000 km and 15,000 km per year for a base vehicle equipped with all required options
  - + Actual expenses<sup>2</sup>.
- 40% quality – sub criteria:
  - 25% technology (including battery type and charging time)
  - 5% safety
  - 5% comfort
  - 5% guarantee and maintenance

### **CNG driven vehicles**

Award criteria were price (50%), quality (40%) and environment (10%) for CNG driven vehicles.

- 50% price – calculation:
  - Purchase price of a base vehicle equipped with all required options
  - + Average cost of maintenance and repair contract
  - + Actual expenses
- 40% quality – sub criteria:
  - 20% technology
  - 10% safety
  - 5% guarantee and maintenance
- 10% environment – sub criteria:
  - 5% environmental performance - assessed through the Ecoscore methodology (see text box 1)
  - 5% description of the vehicle's impact on the environment and of the features the vehicle has to minimise these impacts

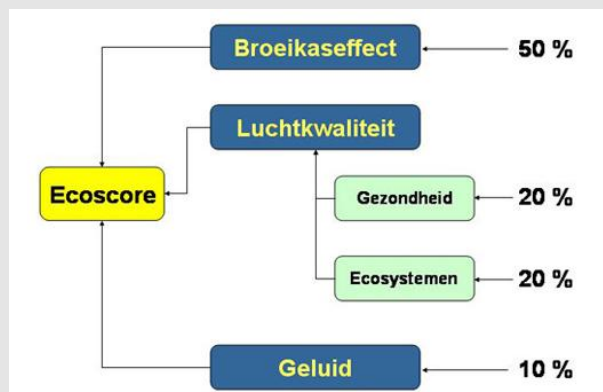
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<sup>2</sup> 'Actual expenses' refers to any possible additional costs for extras, e.g. extra device, a tool on the vehicle that is not standard etc. Taking into account 'actual expenses' assures budget availability during the lifecycle of the vehicle.

### Text Box 1 – Ecoscore Methodology

Ecoscore<sup>3</sup> is a methodology developed by VITO, the Flemish Institute for Technological Research to measure a vehicles' impact on the environment. It gives different weightings to different impacts: 50% greenhouse effect, 40% air quality (20% effects on health and 20% effects on ecosystems) and 10% noise.

To calculate the Ecoscore, the following formula is used. In responding to tenders bidders must provide all the data necessary for the calculation:



$$100 * \exp[-0.00357 * (A * CO_2 + B * HC + C * NO_x + D * CO + E * PM + F * FU + G * dB(A) + H)]$$

CO <sub>2</sub>	CO <sub>2</sub> emissions in g/km
HC	Hydrocarbon emissions
NO <sub>x</sub>	NO <sub>x</sub> emissions
CO	CO emissions
PM	PM emissions
FU	Fuel use
dB(A)	Noise level (driving) in dB(A)

The coefficients A, B, C, D, E, F, G and the constant H vary according to the fuel used and the Euro standard of the vehicle. They can be looked up in a table on the [Ecoscore website](#)

### Contract Monitoring and Management

The contract included the following contract performance clauses:

- Driver training on proper use of the vehicles and for all technology upgrades
- Technical maintenance of the vehicle

Every time the Services and Logistics Department places an order, it thoroughly checks if the delivered models comply with the contract requirements (e.g.: Minimum Euro V, average fuel use based on combined use) or if they already offer an updated version.

<sup>3</sup> For more detailed information about how to calculate the Ecoscore, please visit: <http://www.ecoscore.be/en/book/export/html/182>



## Results

- Only three car companies were able to fulfil the requirements with fully commercialised electric and CNG vehicles. However this was a sufficient number to ensure competition.
- So far 30 electric and 11 CNG vehicles have been purchased within the contract in question, out of a total fleet of 900 vehicles. 6 hybrid vehicles have also been purchased through a separate contract.
- All fleet optimisation activities have and will be widely publicised - targeting private citizens, as well as companies and public organisations wanting to make the shift. A number of communication channels are being used: website, press releases, info on cars, networking events, presentations etc.
- The City's activities have been successful in stimulating the private vehicle market. Recently this has resulted in a public CNG-station being constructed on the outskirts of Ghent.

## Costs

The purchase price for electric vehicles was approximately three times the purchase price of comparable previous purchases. The CNG driven vehicles cost approximately € 5000 more per vehicle + the costs for the slow fill station.

## Environmental impacts

Electric vehicles have no localised harmful emissions (NO<sub>x</sub>, particulates etc.). In comparison to traditional diesel or petrol engines, CNG vehicles also offer substantial reductions in local emissions.

As the City of Ghent only purchases green electricity generated from renewable sources, the electric vehicles also offer a major reduction in CO<sub>2</sub> emissions generated by the city fleets. CO<sub>2</sub> emissions from CNG vehicles are dependent on the source of the gas used – emissions from natural gas typically lie between diesel and petrol, and do not offer a significant benefit. The use of biogas however, can generate substantial CO<sub>2</sub> savings. Biogas will be purchased for the CNG vehicles, if available on the market, but currently there is no biogas provider in Ghent.

In the electric vehicles, electricity consumption is being monitored and the average per mile being calculated. Current electricity consumption is being displayed in every vehicle.

## Lessons learned

- Electric vehicles: Mileage with full battery has proved lower than expected. Cold weather has a significant impact on mileage with full battery.
- Involving end-users in market research, test drives, and consultation rounds has proved very helpful in raising acceptance and convincing users to shift to alternative fuels.

## Contact information

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