

Electric minibuses

Three new minibuses for Brive, France



Purchasing body:	Communauté d'agglomération du Bassin de Brive (CABB)
Contract:	Supply contract for 3 electric minibuses Awarded: February 2016
Savings:	<ul style="list-style-type: none"> • 43 tons of CO₂ emissions saved per year

SUMMARY

- Supply of three electric 5.5m minibuses with a capacity of up to 21 passengers, with autonomous range of up to 140km
- Five year lease and maintenance for batteries and charging equipment included
- Contract value: €571,738.21
- Contract awarded to Bluebus

Procurement Approach

As part of its wider commitment to green growth and sustainability, the Communauté d'agglomération du Bassin de Brive (CABB) is committed to the introduction of electric minibuses. The buses were introduced in July 2016 on a short line following the narrow commercial streets of the town centre. This is aimed to improve the comfort of users, the comfort of inhabitants and customers in city center and lessen the environmental impact of public transport.

The initiative is supported by the French Ministry of Environment through the *Territoire à énergie positive pour la Croissance vert (Green growth positive energy region)* project, which was awarded to CABB in 2015. A green Growth Positive Energy region is one striving for excellence in its energy transition. The public authority commits to reducing the energy needs of its inhabitants, but also of buildings, economic activities, transport, and leisure activities.

A tender was let by CABB for the purchase of 2 electric minibuses in November 2015, with the option of buying two further electric minibuses if wished.

Needs analysis

A first real world test was carried out in 2012 in an urban area over two days. The results were successful, however given the low number of suppliers (of electric minibuses) and the evolving technology, the CABB decided to put this investment on hold.

PROCUREMENT INNOVATION

Meeting suppliers regularly and collecting experiences from other public authorities are prerequisites for defining the need correctly.

Prior to the tender, several other public authorities were contacted to collect information on their experiences. As this technology of minibuses is relatively new no longer term feedback was possible, however the contacted authorities were satisfied with the equipment.

Life cycle costing

The tenderer was required to provide information on the cost of battery rental (with new batteries installed every 5 years) and electricity consumption as well as the purchase price of the vehicle.

Maintenance costs were not included in this analysis, as it was felt there is not enough knowledge and experience on operating the electric minibuses on the current urban/diesel network to make this possible.

Tender specifications and Verification

TECHNICAL SPECIFICATION

- Capacity of 20 – 30 passengers – with 8-14 seated (without driver) and 1 space for a wheelchair
- Autonomous range able to cover the average daily distance of 120 – 140km
- Five year lease and maintenance for batteries and charging equipment – must be operational at outdoor temperatures between -20° and 55°C, including if freezing occurs

AWARD CRITERIA

Price (50%)

- The unit cost of the proposed vehicle and equipment required to operate/charge the batteries (excluding taxes and the battery pack itself) (40 points). The maximum number of points was awarded to the candidate who offered the best price. The other candidates were awarded points proportional to the best offer.
- Annual cost of rental and maintenance (curative and preventive) of batteries excluding taxes, with operation estimated at 38 000 km (10 points). The maximum number of points was awarded to the candidate who offered the best price. The other candidates were awarded points proportional to the best offer.

Technical value (45%)

- Maximum capacity and the number of seating places (4 points)
- Dynamic performance and vehicle power, the average electric consumption on urban cycle - SORT 1 (5 points)
- Accessibility, functionality, interior fittings and interior/exterior equipment of the vehicle (13 points)
- Maximum autonomy of batteries on flat urban circuit for a vehicle without air conditioning (8 points)
- Training of personnel for starting, operating, servicing and maintenance of the vehicles and charging equipment (4 points)
- Duration of the various vehicle guarantees (6 points)
- After-sales service, including the definition of the curative and preventive maintenance program (5 points).

Environmental performance (5%)

- Quality of the traction batteries (2 points)
- The End-of-life processing of batteries (1 point)
- The recyclability rate of the vehicle (2 points).

VERIFICATION

As part of the technical assessment, bidders were required to provide full technical information on the battery, energy storage approach and autonomous range and recharging for the vehicles.

In relation to the environmental performance criteria the bidder was required to specify:

- whether the vehicles are made of recyclable or recoverable materials.
 - the proportion of recyclable materials for each vehicle (recyclability rate).
 - measures put in place for protecting the environment for the design and manufacturing of the vehicles.
 - the entire end-of-life processing of the batteries used by the vehicles
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Results

Environmental impacts

The contract will lead to an estimated saving of **43 tCO₂/yr**, based on the standard French electricity mix.

This is despite the fact that there is a substantial increase in primary energy consumption (due to the primary energy conversion factor for electricity over diesel).

Table 1: Environmental savings – green tender compared to current solution

Tender	Consumption	CO ₂ emissions (tonnes/year)	Primary Energy consumption (GWh/year)
Benchmark (current vehicles)	26,000 l	71.62	0,26
Green tender (new vehicles)	195,900 kWh	28.60	0,49
Savings		43.02 (60%)	-0,23 (-88%)

CALCULATION BASIS

- Total distance covered by minibuses in service: 100,000 km/yr;
- Diesel consumption 13l/100km
- Electricity consumption: 65.3 kWh/100km
- Conversion rate for electricity – 0.146 kg CO₂/kWh
- Conversion rate for diesel – 2.755 kg/l
- Calculation made using the tool developed within the GPP 2020 project (www.gpp2020.eu), and refined within the SPP Regions project. Available on the SPP Regions website.
(More detailed calculation tables are included in the Annex below).

Financial impacts

48% of the cost of the vehicles was covered by the Ministry of Environment through the *Territoire à énergie positive pour la Croissance vert (Green growth positive energy region)* project.

Market response

Only one company applied for the tender, as there are very few suppliers able currently to offer an electric minibus.

Contract management

As the electric minibuses are new to CABB, the effective management and optimisation of maintenance operations is important. For this reason bidders were required to provide clear information relating to estimated maintenance operations over a period of 3 years, namely:

- Preventive maintenance: cycle, operations to be performed, execution time, cost of replacement parts,
- Curative maintenance: time of disassembly and reassembly of the principal mechanisms and equipment, cost of these components as a standard exchange.

TECHNICAL CHARACTERISTICS

The winning vehicle had the following technical specifications:

- Vehicle dimensions:
 - Overall length : 5,46 m
 - Overall width (without outside rear-view mirror) : 2,57m
 - Overall (total) height : 2,97 m
 - Gross vehicle weight rating (or gross vehicle mass) : 6 170 kg,
 - Empty weight : 4 366 kg
 - Capacity: 21 people transported (carried) (excluding driver): 8 seats, 1 place for passengers in wheelchairs + 12 standing.
- Energy/fuel characteristics:
 - Lithium Metal Polymer batteries, leased from the manufacturer for 5 years,
 - Energy stored in the bus, with specific recharging facilities available at the bus depot
 - Autonomous range of 120 to 140 km , on flat circuits,
 - Average consumption estimated at 0.653 Kwh / Km and an onboard energy of 90kWh

Lessons learned and future challenges

To minimise difficulties in drafting the tender, the characteristics of the vehicle required should be clearly defined, in particular the type of battery, battery charging method and the operating costs.

Some general advice for such electric vehicle contracts:

- The energy pack should be separated from the vehicle itself. Lease the energy pack (battery) in order to avoid difficulty when there is a problem or a reduction in the range.
- Pay attention to the recharging aspects of the batteries. Several solutions exist on the market, with different characteristics. It is advised to meet the staff of the organisation which will have to use the vehicles (driving and maintenance staff).
- Training is also important, the driving and maintenance of an electric vehicle are different from combustion engine (thermal) vehicles.

In general, the purchase of electric minibuses does not pose any technical difficulties and from a commercial point of view these minibuses are appreciated by the users and the drivers. This contributes to the good image of the transport network and of the C.A.B.B, as a key actor in the energy transition.

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Annex 1 - Calculation of environmental savings

Input	Baseline				Green tender			
	Quantity of vehicles	Average distance per vehicle per year (km/yr)	Kind of fuel	Amount of fuel per 100 km	Quantity of vehicles	Average distance per vehicle per year (km/yr)	Kind of fuel	Amount of fuel per 100 km
Standard Engine - fuel 1	2	100.000	Diesel	13,0 l/100 km	Diesel		Diesel	l/100 km
Standard Engine - fuel 2			Diesel	l/100 km	Diesel		Petroleum	l/100 km
Electro Engine			Electricity	kWh/100km	3	100.000	Electricity	65,3 kWh/100km
Hybrid Engine								
Electricity (combined test cycle)			Electricity	kWh/100km			Electricity	kWh/100km
Fuel (combined test cycle)			Diesel	l/100 km	Diesel		Diesel	l/100 km

Savings	Total savings (Baseline / Green tender)			
	Energy savings (GWh/yr)	CO ₂ -savings (t/yr)	% of energy savings	% of CO ₂ -savings
Standard Engine - fuel 1	0,26	72	100%	100%
Standard Engine - fuel 2				
Electro Engine	-0,49	-29		
Hybrid Engine				
Electricity (combined test cycle)	0,00	0		
Fuel (combined test cycle)				
TOTAL FOR THE PROJECT	-0,23	43,02	-88%	60%

About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWh/year primary energy savings and trigger 45 GWh/year renewable energy.

SPP REGIONS PARTNERS



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