



Purchase of Low Emission Buses

Ljubljana Public Transport (LPP)

- 30 new buses for city public transport
- Contribution to 24 % CO₂ emission reduction



Benchmark tender

- Diesel powered vehicles
- Emissions of 43,830 t CO₂e/life cycle

GPP 2020 tender

- CNG powered vehicles
- Emissions 33,210 t CO₂e/ life cycle

Results

- Energy savings of 2,236 toe
- CO₂ emission savings of 10,620 t (24 % reduction)

Green Public Procurement

- On the 1st September 2015 the public company Ljubljana Public Transport (LPP) published a tender for the purchase of 30 flexible, low-floor, low-emission busses. The tender was published as an open procedure on public procurement portal and in the Official Gazette of the European Union.
- Four bids were received; one offered diesel engine buses and the other bidders offered buses powered by natural gas.
- In the evaluation procedure, conducted according to the Regulation on Green Public Procurement (hereinafter: the Regulation) and scoring system for technical performance of buses, the bidder MAN Truck & Bus Slovenija d. o. o. was chosen. The buses must be supplied to the contracting authority by May 2016.
- The public tender was part of the company and municipality of Ljubljana strategy for modernisation of the LPP city passenger transport fleet powered by natural gas. LPP aims to have half of its current fleet of buses powered by natural gas.

Procurement approach

Type of procurement procedure: Open procedure

Subject matter: Purchase of 30 flexible, low-floor, class I public transport buses

Technical specifications: The following environmental criteria were required:

- values for LCC calculation (in accordance with the formula from GPP Regulation - $LCC = N_c + (LC_{km} \times [(poraba_E \times PE \times CE_{min} / PE_{min}) + (CO_{2em} \times CCO_2) + (NO_{xem} \times CNO_x) + (NMHC_{em} \times CNMHC) + (PM_{em} \times CPM)])$),
- EURO VI standard,
- insulation of the engine to reduce noise emission levels,
- gear shift without “kick down” function which includes a terrain self-adjustment programme that lowers fuel consumption,
- fully synthetic gear shift oil for prolonged change interval,
- two years warranty.

Award criteria: The award criteria included the lifecycle costs of the bus (98%) and technical performance of the bus (2%).

Contract performance clauses:

The contractor must provide training for optimal (efficient and safe) driving techniques for at least one person (driver) per vehicle. The contractor must also provide training for technological, mechanical and diagnostics personnel as well as for electricians and purchasing officers.

Criteria development

The environmental criteria are listed in the Regulation. All bidders had to specify the fuel consumption as well as CO₂, NO_x, NMHC in PM emissions of the buses. These parameters were then used to calculate the environmental life cycle costs of the buses. The results were scored and summed up.

Results

Energy savings and CO₂ reductions are calculated according to the GPP 2020 methodology. The calculation included 30 new buses. The new vehicles use methane – compressed natural gas (CNG) as a fuel, while the old vehicles used diesel fuel. The high mileage of the new vehicles in the life time cycle is estimated 1,020,000 km and their fuel consumption is 43.2 Nm³/100 km. The manufacturer guarantees at least 12 years of life time for the buses and 20 years for CNG cylinders.



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	CO ₂ emissions (t CO ₂ e/life cycle)	Volume of energy released from fuel in the life cycle of the vehicle (TOE/life cycle)
Low Carbon Tender: natural gas powered vehicles	33,210 t CO ₂ e/ life cycle	11,466 TOE/ life cycle
Benchmark tender: diesel powered vehicles	43,830 t CO ₂ e/ life cycle	13,682 TOE/ life cycle
Savings	10,620 t CO ₂ e/ life cycle	2,236 TOE/ life cycle

Calculation basis

- Low carbon tender: the average fuel consumption is 54 kg CNG/100 km, which equals 43.1784 Nm³ CNG/100 km.
- Benchmark tender: the average fuel consumption was 52 l/100 km.
- High-mileage of diesel powered vehicles in their 20 year life cycle was 1,020,000 km (51,000 km/year).
- Estimated mileage of natural gas powered vehicles in their 20 year life cycle is 1,020,000 km.

Lessons learned

The public company Ljubljana Public Transport conducts all tenders according to current legislation, in this case according to the Regulation on green public procurement. In regard to the Regulation we see the problem primarily in the requirement that the procurer cannot determine the type of fuel. Consequently, it is not possible to prepare quality tender documents because we should on the one hand prepare multiple technical specifications for all commercially existing types of fuels (diesel, natural gas, electric, hybrid variants, etc.). On the other hand we cannot even determine the technical requirements for a new type of fuel for which we do not yet know that it may already be present on the market, while the vehicle supplier has the right to offer such a vehicle in a public tender. Therefore, the type of fuel is determined by the vehicle supplier and not the public procurer. This makes it difficult to implement the strategy of purchasing vehicles that use alternative types of fuels!

In evaluating the tenders the contracting authority shall take into account the costs over the life cycle of the bus. The formula for the calculation and its individual elements are defined in the Regulation. The largest share of the costs over the life time of the vehicle represents the purchase price of the vehicle and the price of the fuel consumed. The Regulation specifies that the contracting authority must include in its calculation the price of the vehicle with VAT included but the price of fuel is to be used free of any duties. Of course, such requests are completely different from the actual situation and favour vehicles that do not use modern technology.

In practice, the contracting authority recalculates VAT and gets it refunded while duties on fuel are not refunded and are paid in whole (only a portion of excise duty is refunded) and thus these costs are a heavy burden for the contracting authority. Buses that are greener and are powered by natural gas or electricity are already in the start between 15 % and 100 % more expensive compared to buses powered by diesel fuel. When on these prices VAT is added, the absolute difference between the prices of vehicles is increased up to a point that it is almost impossible for the technologically advanced buses to overcome diesel classics.

For example:

- Price of a single city diesel bus, length of 12m: € 200,000 (VAT excluded) or € 244,000 (VAT included)
- Price of a single city natural gas bus, length 12m : € 230,000 (VAT excluded) or € 280,000 (VAT included)
- Price of single electric city bus, length 12m: € 400,000 (excluding VAT) and € 488,000 including VAT.

Currently (19.1.2016) the price of diesel fuel at a public pump is € 0.988 /litre (VAT and other taxes included) which is the price paid by us and represents a cost. The price of diesel fuel without any charge is only € 0.3315 /litre and this is a value that must be inserted into the formula for calculating the lifetime costs of the vehicle. However, it is impossible to buy

diesel fuel at such a price; we have to pay standard retail price. Thus, for each litre of diesel consumed, fuel cost is artificially reduced for € 0.65645 /litre.

When natural gas is used to drive the bus, it is necessary to take into account the need to use electricity to compress the gas and that the compressors are strong enough to be able to compress the gas to a pressure of 200 bars. Therefore, natural gas is more expensive than diesel, even after the price of gas is »purified« of all charges. In this case, the cost of natural gas is greater than the cost of the diesel fuel and the gas is non-competitive.

Of course the Public Procurement Act allows an additional reward of the vehicles that enable the use of alternative fuels, however procurers believe that such shortcuts to reach the target is unnecessary and that the contracting entities themselves should decide what type of fuel they wish to use and then within these groups seek the most cost-efficient solutions.

Likewise, the legislator did not consider that contracting authorities for a certain categories of motor fuels might not have at all the appropriate charging infrastructure on disposal or there is limited capacity of the existing infrastructure charging. As a result, public authorities are faced with the question how to use the vehicles for which no adequate charging infrastructure exists.

Additionally, the preparation of the tender documents primarily from the point of view of the technical specifications requires time, experienced staff and accurate evaluation of individual parts of the bus.

Judging from our experience and measurements we are aware that for Ljubljana the use of CNG gas is much more acceptable than, say, liquid fuels in buses, because the benefits were shown in particular in the following areas:

- Reduced impacts on the environment, particularly in groundwater and consequently drinking water because there is no leakage of fuel (systems are closed)
- Ignition temperature is higher than that of liquid fuels – flammability range of 5% to 10%
- Less contamination in terms of emissions of carbon monoxide (CO)
- Less pollution with regard to particulate matter (PM)
- Less pollution with regard to nitrogen oxides (NOx)
- Less pollution of carbon dioxide (CO₂)
- CNG is lighter than air and acceptable for maintenance.

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Public tender is available at: [Public Procurement Portal. Publication Nr.: JN 5992/2015](#)



About GPP 2020

GPP 2020 aims to mainstream low-carbon procurement across Europe in support of the EU's goals to achieve a 20% reduction in greenhouse gas emissions, a 20% increase in the share of renewable energy and a 20% increase in energy efficiency by 2020.

To this end, GPP 2020 will implement more than 100 low-carbon tenders, which will directly result in substantial CO₂ savings. Moreover, GPP 2020 is running a capacity building programme that includes trainings and exchange. – www.gpp2020.eu

About PRIMES



Across six countries in Europe; Denmark, Sweden, Latvia, Croatia, France and Italy, the PRIMES project seeks to help municipalities overcome barriers in GPP processes, many of which lack capacity and knowledge.

PRIMES aims to develop basic skills and provide hands-on support for public purchasing organisations in order to overcome barriers and implement Green Public Purchasing. This will consequently result in energy savings and CO₂ reductions. – www.primes-eu.net



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