

Transport

Purchase of Environmentally friendly vehicles for The Capital Region of Denmark



Purchasing body:	The Capital Region of Denmark
Contract:	3-year framework agreement (with possible extension for 12 months) Contract awarded: February 2017, Published on 1 st December 2016 Value: EUR 2,7 million
Savings:	<ul style="list-style-type: none"> ■ CO₂ emissions reduced by 1 % (3 tons CO₂/year)

SUMMARY

- 3 year framework agreement on the procurement of 44 vehicles (34 vehicles running on natural gas, 6 electric vehicles and 4 hybrid vehicles)
- Underpins the Regions strive towards reducing CO₂ emissions with 60 % before 2025
- The vehicles delivered were: VW Caddy (gas), Nissan E-NV200 (electricity), Fiat Doblo (gas), Fiat Ducato (diesel) and Toyota Yaris (hybrid)

Procurement approach

The Capital Region of Denmark is working towards a 60 % reduction in CO₂ emissions by 2025. Several initiatives have been launched in order to reach this goal, including phasing out fossil fuel in the Region's transport sector.

To underpin this overall political aim the Unit for Logistic and Supply looked towards green alternatives when they needed to replace a fleet of diesel-driven vehicles.

They completed a tender of 44 vehicles distributed over five subcontracts, which aimed for the following:

- **Subcontract one:** 23 small vans (new from factory). The vehicles **should be natural gas driven**. The cars will be used for collection of samples from medical practitioners and driving of goods. Many short trips driving just a few kilometres at a time and up to 50 stops per day.
- **Subcontract two:** 10 medium sized vans. **Natural gas is preferred** but, due to limited supply of medium sized vans with natural gas compatibility, also vans running on petrol/diesel will be taken into consideration. The vans will be used for collection of samples from medical practitioners and driving of goods, with many stops per day.
- **Subcontract three:** 1 Small car with lift. **Should be natural gas driven**.
- **Subcontract four:** 6 small vans. The cars **should be electric**. The vehicles will be used for collection of samples from medical practitioners. Many short trips driving just a few kilometres at a time with up to 50 stops per day. Total daily driving range (without charge) for up to 80 km (minimum 170 km New European Driving Cycle (NEDC) standard range).
- **Subcontract five:** 4 small **hybrid cars**. The vehicles will be used for collection of samples from medical practitioners and driving of goods. Many short trips driving just a few kilometres at a time and up to 30 stops per day.

Biogas was heavily emphasised as a propellant, as it is CO₂ neutral. It is produced by organic waste and manure that is processed in production plants to become pure biogas. The residual product after the excretion is used to fertilize farmland, so it is an environmentally friendly way to produce fuel. This supports the Region's strategy of reducing CO₂ emissions by 60% by 2025.

PROCUREMENT INNOVATION

The suppliers have committed themselves to purchase the cars back at a pre-determined price upon expiry of the agreement. This means that the Capital Region of Denmark does not end with outdated cars in stock when the contract expires. By doing so, they are at the forefront of development, and can continue to buy better and more environmentally friendly cars.

Needs Analysis

The entire tendering process was initiated by a needs analysis, carried out in order to map the specific transportation needs within the region. All the cars that were to be replaced were equipped with GPS trackers, so the procurers could develop insight into driving distances and routes. The tracking was done over the course of four months to be sure the data was valid.

The users of the cars (the drivers) were not included in the process. However, it has been decided to include them the next time, since they could have important contributions.

Market Engagement

The next step in the tendering process was to engage the market in order to identify possible electric and natural gas driven vehicles that could fulfil the tender specifications and required driving range. The market engagement represented an opportunity to match expectations and ensure there were suppliers that were both interested and able to bid. Some suppliers were invited to a face-to-face talk on possibilities, while others were interviewed over the phone.

Thereafter, the tender specifications were amended so they could be open to as many suppliers of green vehicles as possible.

Particularly electric cars were subject to thorough investigation on the market, but there proved to be significant barriers. For example, the driving range in the vans segment showed to be relatively short (about 70-80 km in freezing weather on a 22 kWh battery), which meant that only 6 out of about 50 identified transport routes could be replaced with electric vehicles.

Biogas vehicles were therefore considered to be the best alternative. Biogas still pollutes the local environment, but the process from biofuel to fuel is a resource-efficient method, and biogas engines are energy efficient and quiet compared to diesel engines.

Tender specifications and verification

TECHNICAL SPECIFICATIONS¹

- The vehicles should be new from the factory and registered (applies to all)
- The vehicles should have the highest emission standard (applies to subcontract 1 and 2)
- The vehicles should as a minimum have four stars in a documented crash test (Euro NCAP) (applies to subcontract 1)
- Service and repair agreements on all cars in a three year period.
- Offer a guaranteed repurchasing price after 3-4 years.
- The vehicles must be suited for the purpose identified in the tender specification, and meet all standards and norms.
- In order to evaluate the requirements in relation to the tender specification there must be provided a possibility to examine and test the offered vehicles. The supplier should make one example of each model available for test driving.

AWARD CRITERIA

- Lowest price (applies to subcontract 1, 3, 4 and 5).
- Best relationship between price and quality (applies to subcontract 2). In the present tender, “quality” refers to type of fuel: 5 points are awarded to vehicles running on natural gas, while cars running on petrol/diesel will not receive any points. The weighting will be as follow: Price 40%, type of fuel 40%, driving range 10% and automatic transmission 10%.
- Low environmental impact is sought without being at the expense of patient- and employee safety and staying within a realistic financial frame.

VERIFICATION

In order to evaluate the incoming offers, the region asked the suppliers to also make one example of each vehicle available for physical inspection and evaluation. This gave the team of procurers an opportunity to test the vehicles and get a feeling of them in a natural environment.

A regional approach to SPP

Within the region there is a continuous exchange of best practice, methodology and results. Good ideas and lessons learned will be distributed to other public procurers.

¹ The tender also contains a list of detailed specifications regarding performance and equipment. The complete list can be requested. See contact information at end of the document.

Results

Environmental impacts

The tender results in an estimated annual reduction of 3.3 tonnes CO₂ emissions. Primary energy consumption increases slightly, however, due to a lower combustion engine efficiency when working with CNG and the greater weight of the vehicles due to the heavier tanks used for CNG storage.

Table 1: Environmental savings

Tender	Driven kilometres in total/year	CO ₂ emissions (tons/year)	Primary energy consumption (GWh/year)
Baseline	1,148,048 (48 cars)	492.3	1.79
Green tender	1,014,722 (44 cars) ²	489.0	1.98
Savings		3.3 (1%)	-0.19 (-11%)

CALCULATION BASIS

- Number of cars: 44
- Average driven distance per type of vehicle and consumption pr 100 km:
 Small natural gas vehicles: 469,522 km pr year and 23.9 Nm³
 Medium sized natural gas vehicles 384,072 km pr. year and 20.4 Nm³
 Electric cars: 122,484 km pr. year and 16.5 kWh
 Hybrid: 38,644 km pr. Year and 3.1 L
- CO₂ emissions of the Danish electricity mix set at 0.329 kg/kWh
- For primary energy consumption a PEF (Primary Energy Factor) of 2.5 was assumed for electricity produced from fossil fuels, and 1.1 for RES³
- 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.

The vehicles delivered were: VW Caddy (gas), Nissan E-NV200 (electricity), Fiat Doblo (gas), Fiat Ducato (diesel) and Toyota Yaris (hybrid).

² Note: the present tender is for 44 vehicles against 48 vehicles in earlier tenders. This is because 4 of the cars have been replaced by 3 electric scooters that are easier to manoeuvre around the city areas

³ Source: Ecofys, Development of the Primary Energy Factor of Electricity generation in the EU-28 from 2010-2013, 2015

Financial impacts

TCO-calculations have been completed but are not used as a criterion in the offer. They have been used alone as a tool to assess the benefits of various environmentally friendly vehicles.

Contract management

There are plans to employ three fleet management staff. Two of them will work with the fleet on a strategic and evolving plan. That is, they will follow up on consumption, driving patterns and the like. The last employee will work on a more practical level and keep the cars free of damage.

Lessons learned

Prior to the decision to shift to environmentally friendly transport, a larger investigative work was initiated to clarify possibilities and desires. There were also considerations as to whether it was better to wait for more energy efficient and longer-range electric cars. In the meantime the existing car fleet became increasingly worn out. The Capital Region of Denmark ended in a situation where all vehicles needed inspection and repairing which is costly. It was therefore a bad decision to wait too long for development in technology in relation to the economy of the existing fleet.

Furthermore, subcontract number two (ten medium sized vans) and subcontract number four (six small electric vans) had to be re-issued because the market could not deliver on a range of the first sets of criteria. The initial market engagement had only dealt with possible types of fuel and driving ranges, while the more specific and operational criteria for the fleet itself was considered a formality. However, it turned out that many of the practical measures requested in the tender documents (e.g. automatic transmission and adjustable passenger seats) were not standard in these types of vehicles. It is an important lesson learned that also the more practical and technical details on the bodywork of the car needs addressed during the market engagement.

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Environmental
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Annex 1

Calculations 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.

Location	Denmark		CO ₂ -emissions per kWh (kg CO ₂ /kWh)	0,329							
Input	% Green electricity for Electro engine (if any)		0%		% Green electricity for Electro engine (if any)		0%				
	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	1	571 592	Diesel	15,5	l/100 km	1	469 522	CNG	23,9	Nm ³ /100 km
	Standard Engine - fuel 2	1	561 336	Diesel	16,0	l/100 km	1	384 072	CNG	20,4	Nm ³ /100 km
	Electro Engine	1	15 120	Electricity	16,5	kWh/100km	1	122 484	Electricity	16,5	kWh/100km
	Hybrid Engine										
	Electricity (combined test cycle)			Electricity		kWh/100km	1	38 644	Electricity		kWh/100km
	Fuel (combined test cycle)			Diesel		l/100 km			Petroleum	3,1	l/100 km
	TOTAL	2	1 148 048				3	1 014 722			
Total consumption and emissions	Baseline				Green tender						
	Annual fuel consumption	Energy consumption (GWh/yr)	CO ₂ -emissions per year (t)	Total amount of fuel during the life time of the vehicles	Energy consumption (GWh/yr)	CO ₂ -emissions per year (t)					
	Standard Engine - fuel 1	88 597	l	1,78	244	112 216	Nm ³	1,92	282		
	Standard Engine - fuel 2	89 814	l	247	78 351	Nm ³	197				
	Electro Engine	2 495	kWh	0,006	0,82	20 210	kWh	0,051	6,65		
	Hybrid Engine										
	Electricity (combined test cycle)	0	kWh	0,00	0	0	kWh	0,01	0		
	Fuel (combined test cycle)	0	l	0	0	1 198	l	3			
	TOTAL			1,79	492,3			1,98	489,0		
	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		-0,14	12	-8%	3%						
Standard Engine - fuel 2											
Electro Engine		-0,04	-6	-710%	-710%						
Hybrid Engine											
Electricity (combined test cycle)		-0,01	-3	#DIV/0!	#DIV/0!						
Fuel (combined test cycle)											
TOTAL FOR THE PROJECT	-0,19	3,3	-11%	1%							

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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