



Rental and purchase of photovoltaic charging stations for electric vehicles

OesteCIM, Portugal

- Local energy production to charge Electric Vehicles
- 38% of the energy is produced by the charging stations
- 28.9 t CO₂e-savings over 12 years



Image source: OesteCIM

Benchmark

- Conventional grid electricity
- 6.6 t CO₂e/year
- 1.1 toe energy

GPP 2020 tender

- Photovoltaic charging systems
- 4.2 t CO₂e/year
- 1.1 toe energy

Results

- 2.4 t CO₂e-savings/year
- 28.9 t CO₂e-savings/lifetime
- 36.7% of CO₂e emissions savings over 12 years

Contract tendered

- Tender for the long term rental and subsequent purchase of solar-photovoltaic systems to charge electric vehicles with monitoring software.
- 12 solar-photovoltaic charging stations.
- 6 month lease contract, with subsequent purchase by the municipalities.
- Total cost: 65 500 €

Procurement approach

Tendering followed the direct agreement procedure.

2



12 solar-photovoltaic systems to charge electric vehicles

Technical specifications

- Solar panel of type 230-300 W;
- Inverter of type SMA SB240 or equivalent with appropriate power;
- System that monitors the energy flow produced by the system and the energy consumed at the charging points.

Award criteria

Lowest price.

Criteria development

Criteria were developed in order to partially replace the consumption of conventional grid electricity by the electric vehicles with a localized production solution.

Results

	CO ₂ emissions (t CO ₂ e/year)	Energy consumption (toe/year)
With Solar-photovoltaic systems	4.2	1.1
Conventional grid electricity	6.6	1.1
Savings (annual)	2.4	0.0
Savings (12 years)*	28.9	0.0

* 12 years is the expected lifetime for the Electric vehicles to which the solar systems will be allocated to.

Calculation basis

Estimations were made using the GPP 2020 energy contracting calculator.

In the scope of the procurement of the 12 Electric vehicles by OesteCIM, 12 charging stations with photovoltaic panels were rented. They were part of a separate tender. After the rental period is finished the municipalities will purchase these stations.

The photovoltaic charging stations do not have enough capacity to completely charge the 12 Electric vehicles, but they support part of the energy needed and used by the vehicles.

Data:

- 12 photovoltaic charging stations with 250 Watt average output power, with an average value of daily solar incidence equal to 4.5 hours (excluded the first morning hours and the latest afternoon hours due to weak solar power).
- The Lifetime of the charging stations was estimated as 12 years (the same lifetime as the Electric vehicles), even if the lifetime of photovoltaic panels can be higher.
- We estimated that the Twizy drives 50 km a day with an energy consumption of 8.2 kWh/100 km, which means 4.1 kWh/50 km. Another assumption made was that the 12 Renault Twizy are used only during the week, therefore excluding Saturdays and Sundays, which consists, on average, in 22 days per month.
- Annual Electric Vehicles energy consumption: 12 988.8 kWh (4.1 kWh/day * 22 days/month * 12 months/year * 12 vehicles).
- Annual charging stations energy production: 4 927.5 kWh (4.5 hours/day * 250 W * 365 days/year * 12 stations).
- The low carbon solution value inserted into the GPP 2020 calculator was therefore 4 927.5 kWh of annual electricity produced by the photovoltaic panels plus 8 061.3 (12 988.8 – 4 927.5) kWh of annual electricity produced by conventional sources. As benchmark we chose the national electricity mix.
- The CO₂ emission factor for the national electricity mix in Portugal is considered as: 0.506 kg/kWh.
- The CO₂ emission factor for green electricity was taken from GPP 2020 energy contracting calculator: 0.017 kg/kWh.

Lessons learned

The growing energetic dependence from oil and the tremendous environmental impact resulting from it have led the InterMunicipal Community of Oeste to opt for the installation of the 12 photovoltaic systems to charge the electric vehicles. This choice also has a social effect, aiming to reduce the gap between citizens and renewables sources of energy.

The devices installed can produce and provide 38% of the energy needed by the electric vehicles. It would be therefore desirable, in case of future similar tenders, to increase the

power provided by the devices, in the attempt to achieve the energetic independence of the vehicles.

The acquisition of electric vehicles and photovoltaic charging stations was part of the REPUTE Pilot Project, with purpose is to foster the use of renewables energies in public transports in the oceanic European countries.

The approach is definitely replicable in other communities or cities even on a larger scale, enhancing the number of charging stations and thus the energy produced and made available.

Contact

Paula Trindade: paula.trindade@lneg.pt

Luca Zonca: luca.zonca@lneg.pt

Manuel Salvador: salvador@oestecim.pt



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, 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



The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.

