



## ECO GERADOR ECO GENERATOR



Positive  
mobility

Creativity turned an old x-ray van into an innovative Ecological Generator aimed at:

- Providing the airport with a sustainable mobile energy supply solution;
- Learning more about renewable energy sources and energy storage;
- Raising awareness about the difficulties of producing, storing and managing electricity and water.

In 2016, construction began on an alternative solution to diesel generators for supplying electric power for events and studies taking place in areas of Faro Airport not covered by the electric power supply network.

Enthusiasm and teamwork made the dream come true: solar panels were installed in the generator and old batteries from diesel generators and the aluminium structures used in the places COVID-19 testing was done were reused.

The layout of the solar panels took into account the maximisation of energy production, as well as the different uses and constraints of a mobile structure. Those that were placed on the sides of the structure, usually facing east and west, can be tilted, which means they can be closed while the Eco Generator is being transported; when they are in use, the angle can be changed in order to “follow” the sun. This solution, along with the sensors and automation, allow the panels to be closed when it rains protecting the inside of the van from the elements.





Some of the panels are independent of the van so that they can be taken to where they need to be used with external resources if the electricity consumption requires extra power.



In this environment that is conducive to research, development and innovation, the thirst for knowledge about new technologies has led to the installation of two wind turbines on the top of the east and west sides of the Eco Generator. Their layout took into account the minimisation of their mutual influence and the direction of the prevailing winds in the Gago Coutinho Airport area, at Faro.

The use of batteries is aimed at making the Eco Generator completely independent of the electrical grid, as well as learning more about the management of a self-consumption power grid that is exclusively dependent on renewable energy sources.



This project was developed by a multidisciplinary team made up mainly of internal resources and involving a variety of areas: mechanical, electromechanical, electricity, electronics, IT, metalwork, painting, welding, etc. Each team member contributed with their know-how and gained specific knowledge associated with renewable energy – a win-win situation, creating value for the company and for its staff.





The process was automated using professional expertise associated to systems that incorporate functionalities independent of human action, namely automatic baggage routing, automatic runway lighting control, automatic air conditioning control in the passenger terminal and management of automatic doors and gates.

As this is a constantly changing project, it is important to characterise its operation and the different solutions studied, through remote monitoring and by recording weather conditions and electricity use for future analysis. Learning more about battery performance, the influence of foggy weather, the useful life of the equipment in places near the sea and the influence of other factors will be the starting point for creating other projects that are larger in dimension.



In line with market trends, the voice activation component of the majority of the equipment, using the Amazon voice assistant, Alexa, was added to the automated system.

The problem of water shortages was not forgotten: this van makes it possible to raise awareness about the inherent difficulty of collecting this valuable resource during periods of low rainfall.

Our ancestors had no access to running water so they managed their water consumption according to the cost of transporting it from the source - surface or underground - to its final consumption. As society evolved, the apparent easy access to water (just turn on the tap) meant that the careful management of yesteryear was neglected.

To demonstrate the value of each drop of water collected, this van was equipped with a thermodynamic cooling cycle process, a byproduct of which is the condensation of the water present in atmospheric humidity, stored in tanks for later use, particularly supplying firefighting vehicles... This process is optimised through being exclusively used when there is a surplus of energy production, which can be taken advantage of through the use of automation.





The result was a versatile ecological generator for different types of electricity distribution, incorporating: 12 solar panels (capacity: 3 560 Wp), a 10-kW inverter (input 48 VDC, output 230 VAC); 2 wind turbines (capacity: 840 Wp) and 12 batteries (3 x 48-V packs, autonomy 670 Ah).

Although it was presented to the airport community in early 2022, this is a dynamic project aimed at keeping up with technological developments.

In 2005, a golf cart was equipped with a solar panel, charging the battery with a resource that is plentiful in the Algarve: the sun. At that time, 2 m<sup>2</sup> had a capacity of 80 Wp. In less than 10 years, this capacity doubled and costs decreased.



Apart from establishing that solutions like this will be more interesting in the near future, it also highlights the opportunity to give free rein to the creativity that generates innovative projects.

