



Subject: Presentation of Net Zero Energy

Date: 28/08/2020

Dear Ladies and Gentlemen, good evening,

It is of great pleasure and privilege my participation in this forum. I want to thank the organizers of this forum (HERMES and ATN), especially Dr. Iatrou and Mrs. Iatrou, for this great honor they have given me.

First of all, allow me to say a few words about my company. I am an engineer and Vice President of Easy Power S.A., a company that is now investing in PV power plants for over thirteen years. Our holistic approach in our investments (development, design, study, and installation) has provided us with technical expertise in customized Solar Hybrid Systems for On-Grid (connected with the grid) and Off-grid applications. We are holders of a Patent from the Industrial Property Organization to design autonomous-hybrid units for energy production based in ship containers. Our systems are already in use by NATO military forces mainly for off-grid applications.

In the last two years, based on the expertise we have in the design of solar hybrid units with very high standards (NATO), we offer our services to airports that consider the possibility of investing in reducing energy costs and minimizing carbon footprint. But I will describe more about that later on.

Despite Covid-19 short and mid-term effects, the Aviation industry is committed to specific actions to protect the environment by investing in:

Energy-efficient infrastructures

Minimizing energy footprint

Upgrading to level "+3" Airport Carbon Accreditation

Meeting environmental standards ISO 140001 and ISO 50001 Net Zero Energy

Therefore, today's main aim will be to provide you information on the airport's primary system architecture towards 2030 and 2050 environmental goals. While reducing average energy cost per passenger, increasing airport profitability, energy supply resiliency, support nearby cities' infrastructure and growth.

Our system will be used in the transformation of the second largest military airport in Greece (115 Combat Wing) to become the first NET ZERO ENERGY and CARBON EMISSIONS military airport in the world, as per USAirForce guidelines and accreditation process.

This unique project that will follow NATO specifications is on the Greek island of Crete in Souda airport. The specific military airport is in use from the USA air force, which has permanent

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personnel and airplanes all year round and also, part of its infrastructures is in use by Chania International Airport (5th largest airport in Greece)

The specific project implementation is with GEK-TERNA Group, the largest infrastructure and renewable energy group in southeast Europe.

The project started with the:

- Installation of energy metering devices in all-electric power substations and large loads for 4 months to record real-time data and in two minutes average
- Recording of all current infrastructures and facilities
- Recording of processes followed by Combat Wing during readiness, training, and day to day operation concerning their energy-consuming devices
- Incorporation of any plans they have for changes in their function, new equipment to use, and expansion.

The above data gathered were used to determine the best approach in terms of cost-benefit with the Hellenic Armed Forces' cooperation. Although the investment funding comes as a donation of GEK-TERNA, the payback period would not exceed eight years, as the annual energy cost of the Combat Wing is 460.000€ and the total project cost is around 3.5million €

This project cost also includes:

1. External heat insulation, replacement of windows and door frames on all airport buildings that have a high environmental footprint
2. Replacement of all diesel boilers rooms for heating with heat pumps
3. Replacement of all-electric water heaters with solar heaters
4. Replacement of all vehicles using fossil fuels and operate inside the airport with electric vehicles adding a small number of electric tricycles
5. Installation of 15 DC charging points for electric cars and tricycles charging
6. 1.7 MW PV station within airport borders
7. Large capacity battery storage system using Li-ion cells
8. Grid forming inverters
9. Specially designed Energy Management System will allow the monitoring and the management of the energy flow on all airport main electric lines, on the PV system, on the battery system, on the grid, and on critical and non-critical loads. The system's management can occur in real-time or programmed based on a weekly schedule and the weather forecast. Most importantly with all the above in 2021 this airport will become the first NET ZERO ENERGY AND CARBON EMISSIONS AIRPORT IN THE WORLD

As far as Net Zero Energy and Carbon emissions on Airports and the environmental goals that have to meet, it is evident that the plans are not achievable by only saving energy. There has to be a considerable amount of energy production by making use of RES.

Any decision regarding the technology that will use for energy production must consider the following aspects:

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- Mature enough technology to enhance stability to Airport operations
- Meet Airport safety regulations
- Ability to use it within airport borders
- Widely used to have a low investment cost and an energy production cost lower than Airport energy suppliers

In the last few years, the joint use of two technologies proved that it could play a crucial role in airports' transformation to meet the environmental goals and reduce their energy cost.

These two technologies are Solar energy production together with battery storage systems, mainly with Li-ion cell technology. The combination of these two systems offers several advantages that are difficult to find in other energy production technologies. Briefly, these are:

1. Solar panels wide use and high demand led to an 89% price drop as of 2010 while another 59% is expected by 2025, bringing their global average installation price between 0,05€/KWh
2. Solar panels' degradation levels dropped by almost 50% within the last 20 years, which means that after 20 years of operation, they lose only 10% of their initial performance.
3. Li-ion cell technology reduced more than three times battery size while reducing charging and discharging more than twenty times. These characteristics allowed engineers to create very efficient microgrids that can operate parallel with the grid or independently. Microgrids are an essential part of our technical know-how.
4. EV development and penetration in the automotive market together with large utility-scale storage dropped the Li-ion cells price more than 90% since 2010 and expecting a further reduction by another 50% by 2029
5. Solar weather prediction systems allow an accurate prognosis of the energy that will be injected to the grid 24 hours before
6. Both technologies can meet airport safety regulations.
7. Their performance can stabilize the grid.
8. Both system reaction times in grid abnormalities are in ms (much less than the blink of an eye)

Above advantages in an airport translate to:

1. Minimization of grid transformation losses (HV to MV and vice versa) since the installation of small microgrids inside the airport will bring close energy production point and consumption point
2. Elimination of demand peak power costs from the grid since the battery system can provide that demand power when needed
3. Reduce energy costs since solar with battery in the South of Europe can produce energy currently with a price >0,06€ 50% lower than the average electricity cost in Europe which is in the range of 0,12-0,13€/KWh



4. Cover a large part of the extra energy costs that EV charging will bring to airports by producing green energy that part of it will sell at competitive prices to EV owners
5. Reduce carbon footprint
6. Resiliency during grid blackouts since solar and batteries can create a microgrid to hold all critical loads with reaction times in ms
7. Solar panels on rooftops of buildings-hangars, parking spaces provide heat insulation, sun and rain protection
8. By reducing energy supplied by the grid to the airport and by eliminating demand peak power, essential power resources will become available to grid operators enabling them to redirect it for the development of the nearby cities and the country
9. Most notably is the ability to achieve NET ZERO ENERGY and reduce substantially Carbon emissions as set by ACI Europe as long as airport geographical position and free surfaces to install solar panels is enough

Based on all the above, airport investments in solar +battery storage systems can enhance airports with necessary abilities, becoming crucial in a sector that will play a key role in environmental protection.

Our company having had an unquestionable experience on Solar Hybrid Systems can perform a full study and analysis on operating Airports or in Airports under construction that wish to become Net or Near Zero Energy and Carbon Emissions.

Thank you once more for the opportunity you gave me to present you our solutions for the energy challenges Airports face.