

e-ISLAND

Sustainable Electric Mobility Plan



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1.- History

The Port Authority of Santa Cruz of Tenerife is a member of the United Nations Global Compact, whose principles are based on supporting and developing, within its sphere of influence, the Sustainable Development Goals (SDGs).

With the objectives of sustainable development of the United Nations, it is intended that companies not only generate wealth, but also development worldwide, promoting positive impacts that change the way of doing business and improve the welfare of society.

The principles of the global pact are based on the diversity of the United Nations, about human rights, labour standards, environment and anti-corruption. The entities that join the United Nations Global Compact accept the principles and commit themselves to apply them. These entities must perform an annual analysis of the progress made.



Table: Sustainable development goals

Likewise, the Port Authority, through its sustainability report, materializes its commitment to transparency in its management. In this way, it provides a broad view of its achievements and challenges in aspects such as competitiveness, quality, in the provision of services, efficiency in the use of resources and their impact on their environment, economic, social and natural.

The Port Authority of S/C of Tenerife, establishes in its Corporate Social Responsibility (CSR) strategy guidelines to achieve sustainable development objectives, with the use of strategic axes, meetings with stakeholders, analysis of needs, expectations, etc.

The Port Authority developed its first "Corporate Social Responsibility Director Plan", which comprises a total of 39 concrete actions and projects, which directly impact on 8 sustainable development objectives:



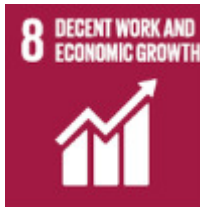
Actions aimed at generating healthy environments in port environments.
Promote the general welfare, applying measures of healthy life among its employees.



Quality education, collaborating with universities (offering work practices to students).



Use of affordable and non-polluting energy, with the use of renewable energies and alternative consumables. Also, make an improvement in energy efficiency in port uses.



Promote sustainable economic growth, commercial promotion of island ports, with the aim of improving the economy. At the same time, implement quality employment policies and give support to developing countries, improve their connectivity and increase freight traffic.



Development of new innovative port infrastructures, with the aim of increasing island economic activity and implementing improvements in infrastructures and services provided.



Reduction of inequalities, making a system of selection of people, adaptations according to merit and capacity, guaranteeing equal opportunities. It also supports integration through employment and professional practices of people with disabilities.



Improvement of port facilities and fight against marine pollution, sanitation networks, services provided to ships, environmental monitoring programs, water quality control.



Alliances to achieve the objectives, with the collaboration with other organizations, to send aid to developing countries, alliances with different NGOs, for corporate volunteering programs.

2.- Sustainable Electric Mobility Plan e-ISLAND

The energy transition is a necessity, which must be considered collectively (Port Authorities, Autonomous Communities, Corporations) and personally. From the Port Authority of S/C of Tenerife, we want to move forward, collectively, towards a new way of generating energy, new methods and improvements to take advantage of them.

Within the "Sustainable Electric mobility plan e-ISLAND", proposed by the Port Authority of S/C of Tenerife, is intended to achieve better sustainable development, following several basic points, proposed by the "Sustainable Development Goals "(ODS) of the United Nations Global Compact:

- Good health and well-being.
- Affordable and clean energy
- Industry, innovation and infrastructure.

With this, the realization of the "Sustainable Electric Mobility Plan e-ISLAND", supposes, a new model of distributed energy, with which will be generated, distributed, and consumed cleaner energies, with a better energy efficiency. In this way, the fundamental objectives of the "Sustainable Electric Mobility Plan of e-ISLAND" correspond to:

- Development of an optimal recharging network in the ports of the province of Santa Cruz of Tenerife, with the electrification of the docks (electric supply to ships), the installation of charging points for electric vehicles, and the incorporation of a fleet of electric vehicles, for use in port facilities.
- Encourage the use of renewable energy in the port, with the installation of various photovoltaic and wind-powered self-consumption facilities.
- Carry out a communication and awareness campaign to implement these new forms of generation and use of energy, to the population of the province of S/C of Tenerife and the rest of the Autonomous Communities. CO₂

The Mobility Plan of the Port Authority of S/C of Tenerife, e-ISLAND, establishes different measures, mostly aimed at reducing the amount of CO₂ that are collected in the following diagram:

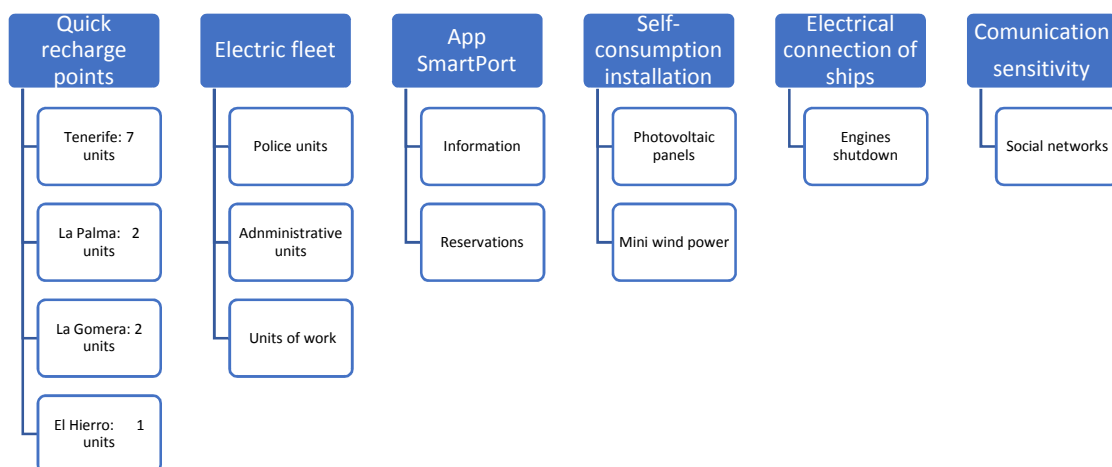


Table: Plan diagram of Sustainable Mobility Plan e-ISLAND

3.- Objectives

The Sustainable Electric Mobility Plan seeks to establish an improvement regarding the environmental, social and economic areas of the Ports of Tenerife. All this based on the most important aspects of the sustainable development objectives of the United Nations Global Compact, and the environmental code of conduct in the ports of Tenerife:

Environmental:

- Reduce emissions of polluting gases (NO_x, PM₂₅, PM₁₀, SO_x) and emissions of greenhouse gases (GHGs), by electrifying the port, allowing ships to connect to the port's electricity grid when they embark, thus turning off their engines.
- Create an electric park, with provision of charging points for electric vehicles, and encouraging their use.
- Maximize the consumption of renewable energies, with self-consumption photovoltaic and wind farms.

Socials:

- To provide more sustainable mobility solutions, which will promote clean alternative energies.
- Sensitize citizens about the advantages of electric mobility.
- Promote the use of bicycles in urban areas, promoting exercise and health.
- Improvement of air quality and acoustics.

Economic:

- Develop the adequate infrastructure to help the implementation of the vehicle in the Canary Islands.
- Enhance the economic development of the sector, encouraging the demand of electric vehicles.

4.- Projects

4.1.- Installation of fast charging points

"We install charging points in our ports, for users to recharge their vehicles while waiting to board their vehicles"

4.1.1.- Objective of the project

The port authority, of S/C of Tenerife, within its program of continuous improvement of the facilities of services in the Ports of Tenerife, decides to realize an installation of charging points of electric vehicles in the different ports of the Islands of La Palma, El Hierro, La Gomera and Tenerife.

All these falls within the: "Sustainable Electric Mobility Plan e-ISLAND", carried out by the Port Authority of Santa Cruz of Tenerife, in order to implement the electric vehicle in the Canary Islands and sensitize the population to the use of these new technologies.

With all this, it is intended to develop an optimal recharging network in ports of the province of Santa Cruz of Tenerife, and likewise, provide charging points for electric vehicles that move within the dock (Port Police, Port Authority Vehicles), in addition to the users of the ships, who make trips between Islands.



Image: Boat trips between islands

4.1.2.- Location of fast charging points

Fast charging points have been installed in the shipping areas of each port, so that the users of the ships that travel between islands can load their vehicle in the waiting time to access the ship. Specifically, in the following locations in the province of Santa Cruz of Tenerife:

Island of Tenerife:

2 fast recharge units have been installed in the vicinity of the dock: "Enlace", within the Port of Tenerife. Likewise, another 2 Rapid Reload Units were installed in the boarding area of Shipping line Armas, in the Port of los Cristianos.

In a second phase, the construction of new recharging points will be implemented, specifically 2 of them at the headquarters of the Port Authority, another 2 units in the vicinity of dock Ribera I, and 1 unit in the Port Authority. The construction of the new charging points will be focused on the use of electric vehicles that are planned to be incorporated, for the fleet of corporate electric vehicles belonging to the Port Authority.



Image: Charging Point, Dock: "Enlace"

Island of La Palma:

Two units have been installed in the Port of Santa Cruz of la Palma in the parking area for vehicle boarding.

Island of La Gomera:

Two fast-charging units have been installed in the Port of San Sebastián of la Gomera, in the parking area for boarding of vehicles arranged in the port.

Island of El Hierro:

Two fast-charging units have been installed in the port of Estaca on the island of El Hierro, corresponding to the parking area for boarding in the port.

4.1.3.- Characteristics of the works carried out.

The installation of the fast charging posts has been implemented in a similar way in the different ports involved. The necessary power forecast in each port varies according to the number of units installed.

Location of fast charging points	N.º units	Power to hire (kW)
Port of S/C of Tenerife	7	323.4
Port of Los Cristianos	2	92.40
Port of S/C of La Palma	2	92.40
Port of La Gomera	2	92.40
Port of La Estaca (El Hierro)	1	46.2

Table: Power requirements

Within the installation of the electrical network, three-phase alternating low voltage networks are used, with a nominal voltage of 400v, between phases and 230v between phases and neutral, with a nominal frequency of 50Hz.

4.1.4.- Installed equipment

The semi-recharge posts for outdoor CIRCUTOR, model RVE-P. These posts are designed to cover all the recharging needs of the VE, in 1-2-3 modes, allowing various recharge speed options, depending on the power demanded between 3.6 and 22kW.

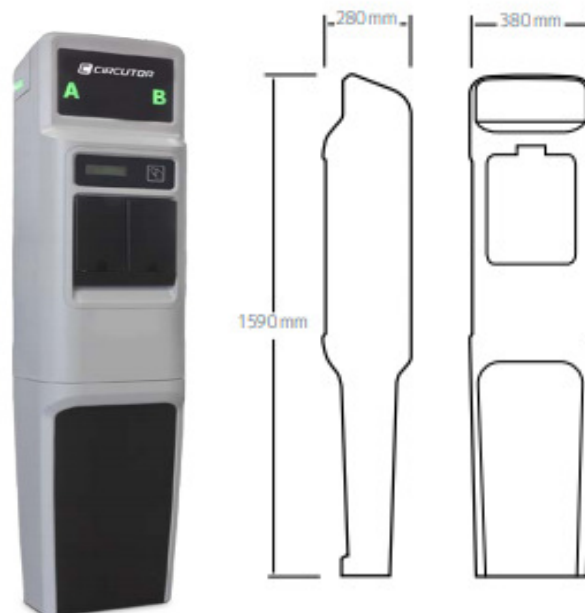


Image: Fast charging points RVE-P

Each equipment has different security systems and allows the simultaneous recharging of two electric vehicles. Its applications are intended for vehicles of any type (cars, motorcycles, bicycles, vans ...).

For the new recharging points that will be built in the vicinity of the Port of SC of Tenerife, and the Port of Granadilla, will be used poles of recharging for outside, of the brand CIRCUTOR, specifically, the URBAN model, with characteristics like the previous ones.

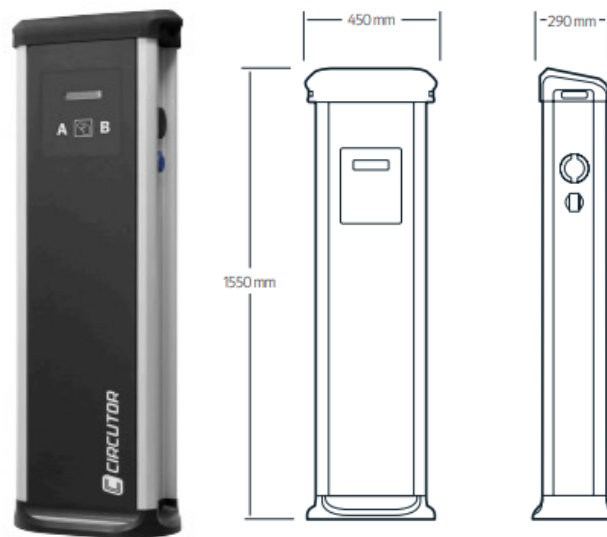


Image: Fast charging points URBAN

4.1.5.- Budget of the works

A total of 9 electric vehicle charging posts, plus 6 recharging posts, have been installed, which are in the process of being installed. The future works of the new power supply posts were presented to the "MOVALT Plan", where they received a subsidy of 60%.

Fast charging points	N. ° of Units	Executed works	Grants
Port of S/C of Tenerife	7	284.955 €	170.977 €
Port of Los Cristianos	2	125.125 €	75.075 €
Port of S/C of La Palma	2	59.876 €	35.925 €
Port of La Gomera	2	50.426, €	30.255 €
Port of La Estaca	1	23.552 €	14.113 €
Total amount:	14	543.974 €	326.365 €

Table: Budget of the works

4.2.- Fleet of electric vehicles

"With the incorporation of the fleet of electric vehicles we generate zero emissions in our journeys, and we encourage their use before citizens"

4.2.1.- Objective of the project

The Port Authority of Santa Cruz of Tenerife is in the process of acquiring a fleet of corporate electric vehicles, which will correspond to the surveillance units of the Port Police, and the service units of offices and works.

In total, it is proposed to acquire a fleet of 18 electric units, with zero emissions, with which the Port Authority shows its firm commitment to improve the environment in the ports of its ownership.

Based on this, it is also intended to promote the use of electric vehicles to citizens, with the different actions that this entails, making known the use of electric vehicles by the port sector, and facilitating different points where to recharge batteries of the vehicles.

4.2.2.- Number of units

It is proposed to acquire the following electric vehicles:

- Lot A: Eighteen units of electric passenger cars (SUV electric minivan)
- Lot B: Three scooter units
- Lot C: Two industrial units (truck crane, open van).

4.2.3.- Budgets

The total budget amount for the purchase of the fleet of electric vehicles and their equipped accessories is 785.700,00€.

4.3.- Installation of electric supply for ships

"Ships in port without emissions, without noise, without vibrations. They are good reasons to differentiate ourselves and provide an innovative service"

4.3.1.- Objective of the project

The main objective of the project **OPS (Onshore Power Supply)** is to carry out a high and low voltage electrical installation for the ships that dock at the S/C ports of Tenerife, La Gomera and La Palma.

The different reasons for the realization of these projects are:

- Environmental impact of ships in the port. It is intended that when boats moor, they connect to the port's electrical network, so that they turn off their engines, thus avoiding consumption, emissions and the noise they generate. To do this, ships are coupled to the port network, and this generation of energy is produced in the electricity companies of the islands, where there are better controls and better reductions of polluting gases.
- Avoid noise and vibrations that are transmitted to homes closer to the dock, producing high noise pollution, especially at night, when the ships spend the night in the ports.
- Reduction of NOx and SO2 emissions, particles, volatile organic compounds (VOC), CO2.

This project has been carried out in ports such as La Gomera, La Palma and is in the execution phase in the port of S/C of Tenerife.

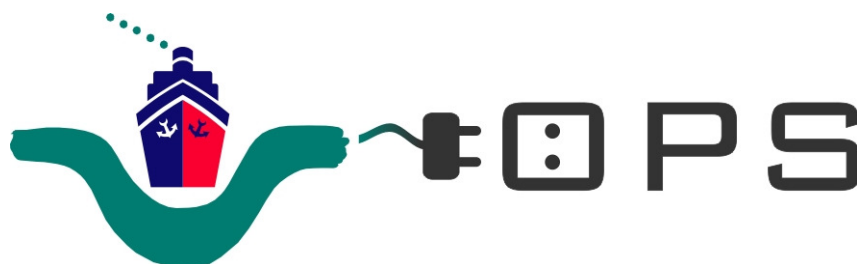


Image: Logo Installation of electric supply for ships

4.3.2.- Electrical characteristics of the ships in port

Port of La Gomera:

The second alignment of the dike is being used by several ships of the shipping company ARMAS. Among them: Volcán de Taburiente, Volcán de Tirajana (Both Ro-Pax) and Alborán (Ro-Ro). All boats have the same typologies and similar characteristics.

The power in port of these vessels is 800kW (1,000kVA).

Port of La Palma:

At present in the East Dike, first alignment, it is being used as usual by the ships of the shipping company ARMAS, Volcán de Taburiente (Ro-Pax) and Alborán (Ro-Ro).

The pier is currently being used, by the ship of the shipping company FRED OLSEN, Benchijugua Express (Fast Passage).

The power in port of the ships of the shipping company ARMAS, correspond to 800kW (1,000kVA) and the power in port of the ships of the shipping company FRED OLSEN correspond to 130 kW.

Port of S/C of Tenerife:

The pier of Anaga, is being used as usual by several shipping vessels ARMAS, Volcán de Tamadaba, Tijarafe Volcano, Volcán de Timanfaya and Volcán del Teide.

The Ribera I dock, it is usually used by the Fred Olsen catamarans, the most common is the Fast Ferry Bencomo Express, although the Bonanza Express and the Bentago express, corresponding to the FRED OLSEN shipping company, can also dock.

The power in port of the Ships of the Shipping company ARMAS, correspond to 800kW (1,000kVA), and the power in port of the ships of the shipping company FRED OLSEN correspond to 100 kW.

4.3.3.- Works to be executed

Port of La Gomera:

In the case of the second alignment of the dike:

- To adapt the 20 kV of the medium voltage power grid, at the 400 V level, a transformer of 1,600 kVA is required, with a transformation ratio of 20 / 0.42 Kv at a frequency of 50 Hz.
- For the electrical connection to the vessel, a cable management system (STEMMAN) is chosen, with a mobile arm, with 5 three-phase connectors for 350 A, each with a maximum power of 1,000 kVA.
- The distribution system is based on an IT system, neutral isolated with neutral not distributed, since it is the most appropriate for the supply of energy to ships and guarantees the continuity of supply.
- This system has a control and monitoring system for the management of power supply (switchgear, alarm, registers), in addition to an emergency trigger system, so that an

automatic disconnection is made if an unexpected event arises, to protect the cable management system and the ship itself.

Port of La Palma:

Depending on the available current characteristics, power is supplied to the dock and dock at a voltage of 400 V and a frequency of 50 Hz. Two electric grids are made, one for each zone.

In the case of the East Dock:

- The power to expect is 800kW (1,000 kVA), for this it starts from the tension of the distribution company, towards a transformation centre of 1,600 kVA. A cable management equipment (STEMMAN) will be installed, with a distribution system IT.

In the case of the pier:

- The power to expect is 136 kW (170 kVA), so it is part of the low voltage network of the company itself, without the need to expand the power.
- The system has a TT grounding and uses a box of power plugs (STEMMAN), in which the boat connects a cable that leaves its electrical grid box.

Port of S/C of Tenerife

In the case of the pier of Anaga:

- To adapt the 20 kV of the average voltage of the electrical grid available in the port, to 400 V, a transformation centre is necessary, which will be formed by a transformer of 1,000 kVA, with a transformation ratio of 20/0.4 kV (0.42 kV in vacuum).
- The connection to each boat will be made with a cable management system, with 5 connectors, with a maximum intensity per connector of 350 A and a maximum total power of 1,000 kVA.
- Two cable management systems will be available in the Anaga pier (CAVOTEC), in order to supply electricity to both vessels that are moored on the sides of the pier (belonging to the ARMAS shipping company), using an IT distribution system for the electricity supply.

In the case of the dock of Ribera I:

- A power of 100kW is necessary.
- An electrical panel will be available, which directly serves a box of power plugs on the surface, with two 350 A connectors, each with a total power of 80 kW, where the ships of the shipping company FRED OLSEN will connect with their cables.
- The system has a TT grounding, and uses box of power plugs provided by STEMMAN

4.3.4.- Systems for the electrical supply

Cable management system

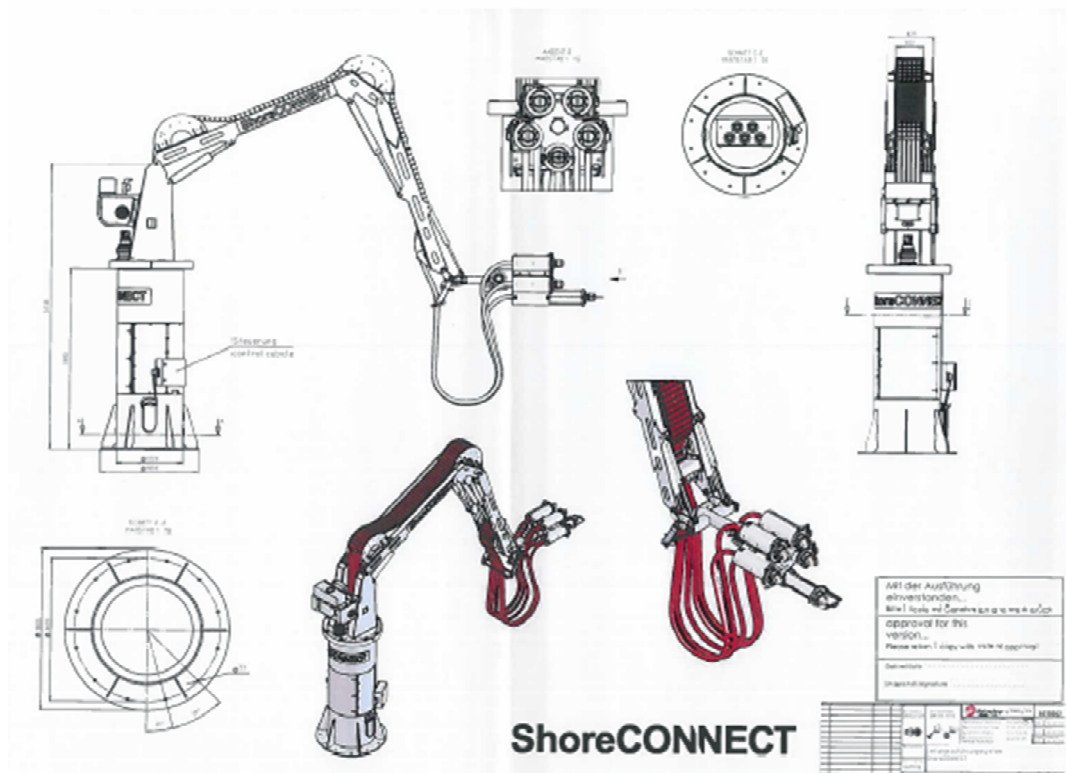
For the second alignment of the dock (Port of La Gomera) and the East Dock (Port of La Palma), a fixed cable management system has been selected, for 1,000 kVA - 400V - 50Hz, with five connection cables to the ship, each finished in a three-phase connector, of the STEMMAN brand.

The equipment will be fed directly from the box installed inside the transformation centre. Each cable of the system has a length of 13 meters.

Each three-phase cable consists of a rated current of 350 A and a rated voltage of 0.6/1 kV.

The cable management system has a security and control system, with which we can establish a control and monitoring, thanks to the programmable logic controller, to the display screens and to the external telecommunications connection. Thanks to this control system, the following functions can be performed:

- Remote possibility of sequences (Connection/Disconnection of the ship, Management of failures).
- Emergency stop.
- Report and record of alarms.
- Management of manual control.
- Reports for maintenance assistance and troubleshooting.
- User interface.
- Energy measurement, power calculations, consumption, etc.
- Telecommunications connection.



Plane: Cable management system "STEMMAN"

For the Anaga dock (Puerto de S/C of Tenerife), cable management equipment is provided by CAVOTEC with very similar characteristics and will be used for the cable management equipment located in the other islands.



Image: Cable management system "CAVOTEC"

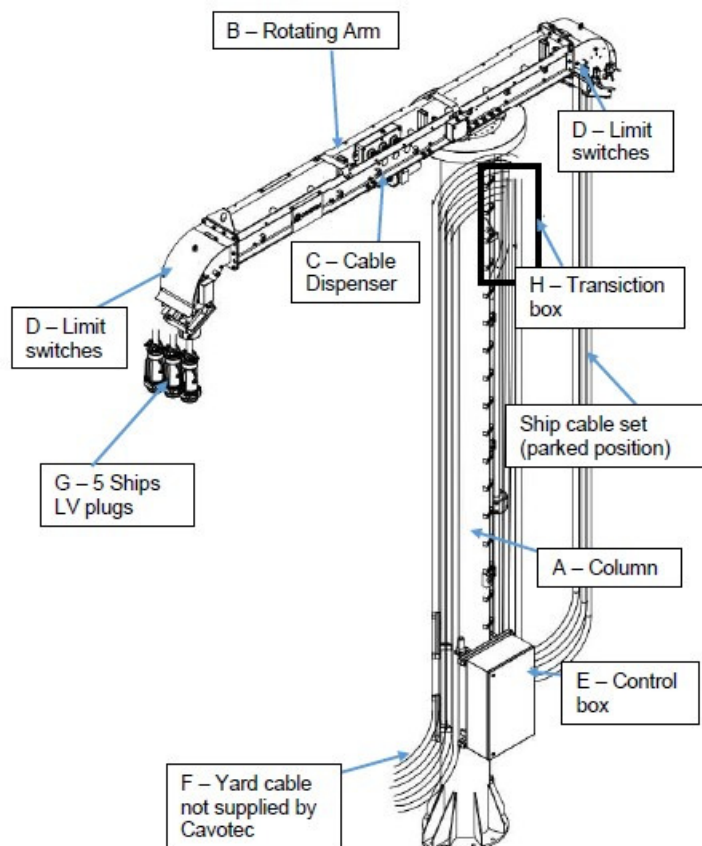
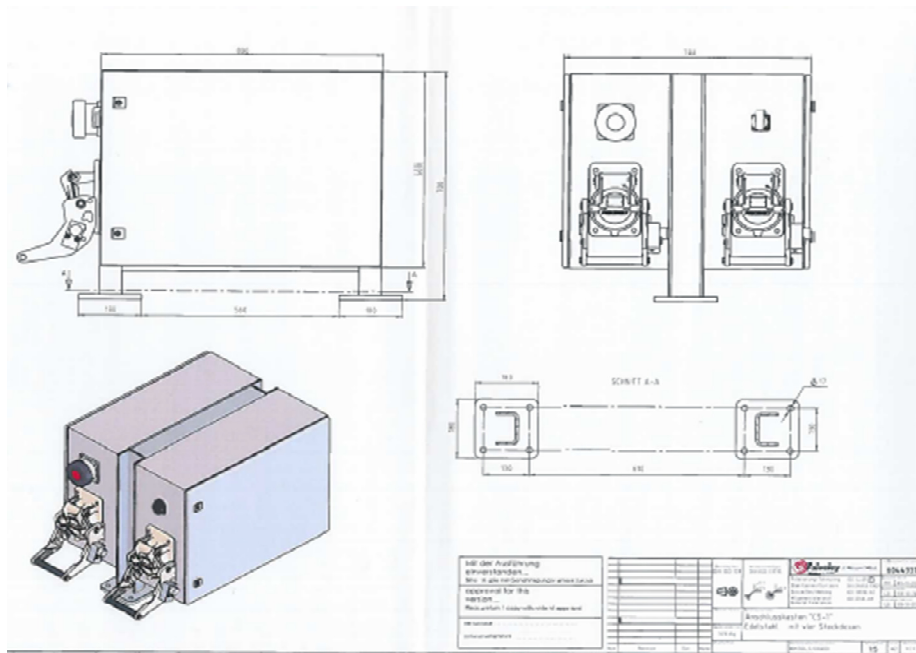


Image: Cable management system "CAVOTEC"

Box of power plugs

The box of power plugs is provided by STEMMAN and have two connectors where vessels can connect with their own cables and connectors, installed in the docks Ribera I in S/C of Tenerife and in the dock of the Port of La Palma.

The sockets of the boxes will offer a power of 350 A - 1,000 V, through 2 three phase sockets.



Plane: Box of power plugs "STEMMAN"

4.3.5.- Budget of the works

The Port Authority is the promoter of these projects. The installation of the port of Santa Cruz de Tenerife has a grant from CEF funds within the "OPS Master Plan for Spanish Ports" project.

Location of Electrical supply systems	Budget	Grants
Port of S/C de Tenerife	774.809,24 €	154.962,85 €
Port of S/C de la Palma	682.831,91 €	
Port of La Gomera	438.270,62 €	
TOTAL AMOUNT:	1.895.911,77 €	154.962,85 €

Table: Budgets of installation of electric supply for ships

4.4.- Self-supply installations

"For our sustainable green port objective, we want to be self-sufficient through the use of renewable energy facilities, providing a greater environmental and social benefit"

4.4.1.- Objectives of the Project

The Port Authority is in a process of continuous improvement of the facilities that are under its ownership. Seeking an improvement of energy efficiency of its facilities, after an intensive study, it is decided to start up the **Genera project**. This project shows its interest in the installation of self-consumption facilities, in order to cover the energy needs required at various points, within the correspondence of the Port Authority. From photovoltaic and wind installations, clean energy is obtained, following the fundamental objectives of the e-ISLAND mobility plan.

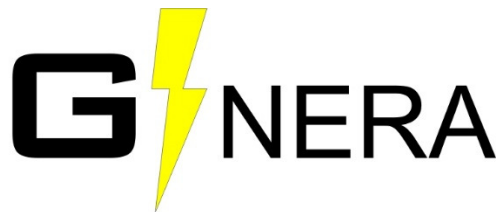


Figure: Logo Self-supply installations

The objectives of the different projects are the design, justification and calculations of photovoltaic and wind solar installations for instantaneous self-consumption, in addition to surplus injections to the electricity grid if necessary.

With the completion of these projects, the facilities of the port authority of Santa Cruz of Tenerife will be equipped with a certain degree of energy supply, thereby reducing the need to consume fossil fuels for the generation of energy. In this way, it contributes with the commitments of energy policy, with the corresponding environmental and social benefit that this generates.

Due to the saving of polluting emissions, energy savings are achieved, which means having less GHG emissions in the atmosphere.

4.4.2.- Location of self-supply installations

Headquarters Building of the Port Authority

Headquarters building of the Port Authority, "number 49, of the Avenue Francisco La Roche ", (point of consumption), and the cover of the warehouse, located in the vicinity of the building, in the " Dock of Ribera ", port of Santa Cruz of Tenerife (point of photovoltaic generation).

The objective is to carry out an installation of photovoltaic panels, which allows the enough generation of energy, for self-consumption of the Headquarters Building of the Port Authority. As the facade of the building is irregular, it is decided to install the panels on the facade of an industrial unit that is in the vicinity of the headquarters building. According to the consumption data of the property, a 90kW photovoltaic generation power will be installed for self-consumption.

Building of Fishermen's Association

The Building of the Fishermen's Association is in the " Espigón de Benchijigua Nº1, in the Muelle de los Cristianos ", South of the island of Tenerife. The purpose of this building is administrative/public/commercial, which is intended to make a self-consumption installation on the roof of the building. The roof has about 400 m^2 of which not all are usable.

A total of 120 photovoltaic modules will be installed, which will allow the production of a power of 30 kW, which will allow enough energy to cover the needs of the building, with the possibility of even giving surplus energy to the electricity grid.

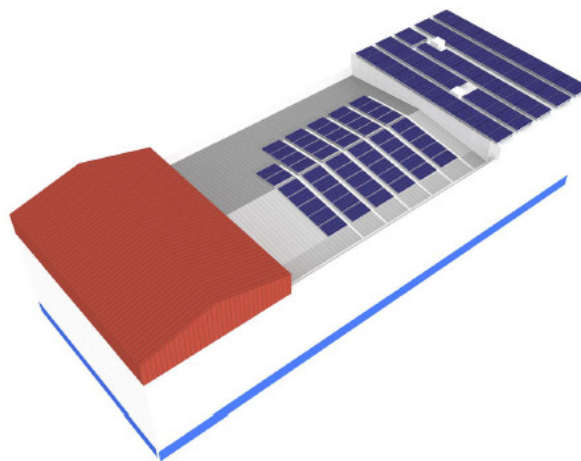


Image: Photovoltaic installation of building of Fishermen's Association

Fish Market

The Fish Market building is in the " Vía de Servicio Nº14, of the Fishing Basin of Santa Cruz of Tenerife Pier ". The purpose of this building is administrative/public/commercial, with what is intended to perform an installation of photovoltaic panels, to cover the energy needs of the building. This building has an upper cover of 2.700 m² which are not all usable.

After carrying out a study, 216 modules of photovoltaic panels will be installed, which will achieve a maximum power of 55 kW, enough to cover the energy needs of the building.

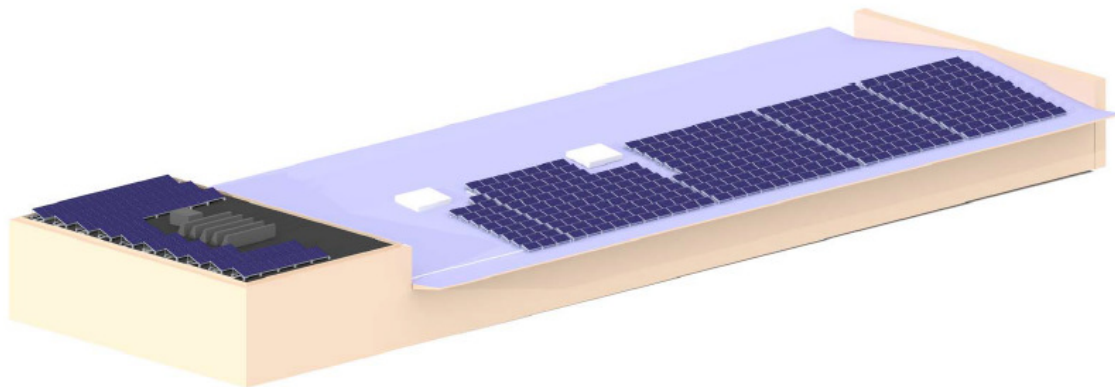


Image: Photovoltaic installation of Fish Market

Ribera's Tunnel

The areas of action will correspond to the Tunnel of the service road, in the Ribera dock (point of consumption), and with the cover of the warehouse located in the Dock of Ribera (photovoltaic generation point) located 100 meters from the entrance of the tunnel.

The electrical consumption of the tunnel will be exclusively corresponding to the lighting thereof, which has an approximate length of 430 meters. According to the consumption data of the tunnel, photovoltaic panels will be installed, with the capacity to generate an energy power of 65 kW, with which the energy demand of the tunnel's interior lighting can be met.

Port of La Estaca and Port of La Gomera

The action areas will correspond to the Port of La Estaca (Island of El Hierro) and the Port of La Gomera (Island of La Gomera). Both ports have a commercial use, with berths, warehouses, and with maritime station. A wind turbine will be installed in each port, which will generate a maximum power of 50 kW, to cover part of the electricity demand of the ports, such as electricity in the maritime station, lighting and auxiliary facilities.



Image: Wind turbines 50 kW

4.4.3.- Components of the installation

Solar modules

The different facilities must always incorporate all the elements and characteristics necessary to guarantee the quality of the electricity supply. Each installation, as a minimum, will have a degree of electrical isolation, basic type (class 1), with its corresponding photovoltaic modules, inverters, conductors, boxes, connection cabinets ... etc.

The photovoltaic modules that will be used for the installations correspond to the Axitec 260Wp model, of the AXITEC SOLAR brand. The photovoltaic modules comply with the specifications of the EN 61215 standard, which guarantees their commercialization, and their adapted use for exteriors. Likewise, these specifications can estimate the average life of the modules manufactured, in about 25 years.



Image: Solar module "AXITEC SOLAR" de 260Wp.

Wind turbines

A wind turbine will be installed in each port, with a unit power of 50 kW, with the following characteristics:

Wind Turbine	
Nº of Units	2
Hub height (m)	24
Rotor diameter (m)	18
Total, height (m)	42
Swept area (m ²)	254,3
Unit power (kW)	50

Table: Wind turbine characteristics

4.4.4.- Budgets and energy savings

Budgets

These projects are subsidized, through financing for the energy renovation of existing buildings and infrastructures of the General State Administration (ERDF -POPE 2014-2020) with a co-financing rate of 85%, therefore, it is possible to reduce the costs of the facilities for the Port Authority, while at the same time reducing the amortization time of the self-consumption facilities considerably. The Port Authority will take care of the remaining 15%, as the promoter.

Location of self-supply installations	Type of Installation	Budgets	Grants
Headquarters Building of the Port Authority	Photovoltaic (90kW)	212.494 €	180.620 €
Building of Fishermen's Association	Photovoltaic (30kW)	75.563 €	64.228 €
Fish Market	Photovoltaic (55kW)	119.827 €	101.852 €
Ribera's Tunnel	Photovoltaic (65kW)	104.760 €	89.046 €
Port of La Estaca	Mini-Wind (50kW)	111.998 €	95.198 €
Port of La Gomera	Mini-Wind (50kW)	150.000 €	127.500 €
TOTAL AMOUNT		774.642 €	658.445 €

Table: Budgets self-supply installations

Energy saving and CO2 emissions

The future installations of photovoltaic and wind energy consumption will suppose a saving of energetic consumption, at the same time as they manage to reduce the emissions of CO2 poured into the atmosphere, which supposes less GHG emissions to the atmosphere.

	Energy saving	Emissions without installations	Emissions with installations
Building of Port Authority	30%	184.569 kg CO2/year	129.934 kg CO2/year
Fishermen's brotherhood	60%	31.952 kg CO2/year	12.682 kg CO2/year
Fish Market	64%	53.550 kg CO2/year	19.507 kg CO2/year
Ribera's Tunnel	85%	49.266 kg CO2/year	7.367 kg CO2/year
Port of La Gomera	49%	54.479 kg CO2/year	27.857 kg CO2/year
Port of La Estaca	68%	58.120 kg CO2/year	18.115 kg CO2/year
TOTAL AMOUNT:		431.936 kg CO2/year	215.462 kg CO2/year

Table: Energy saving and CO2 emissions of Self-supply installations

4.5 Intelligent Public Lighting

"We adapt the lighting level to the traffic intensity of our roads"

4.5.1.- Objectives

Since the beginning of 2013, the Port Authority of Santa Cruz of Tenerife, has carried out a multitude of projects, to change the lighting of sodium vapor (400W-250W) to LED lighting (250W-150W), with the aim of making considerable energy savings.



Image: Logo of energy efficiency improvements

4.5.2.- Location of Intelligent Public Lighting

The facilities for the improvement of energy efficiency are in the different ports of the islands of the province of Santa Cruz of Tenerife.



Image: Location of energy efficiency improvements

In a second phase, more energy efficiency improvements in the docks of the Port of Santa Cruz of Tenerife will be held, as well as placing the LED lighting towers more than 30 meters high.

4.5.3.- CityTouch

In collaboration with Philips and the "CityTouch" program, the Port Authority can control the LED light intensity in the ports, as necessary, reducing energy savings, up to 60%.

The program " CityTouch ", allows to control the lighting of the Ports of La Gomera, El Hierro and Santa Cruz of Tenerife, from the offices of the Port Authority. With this, the amount of necessary light can be programmed, lowering it to the minimum of necessary security, according to the level of circulation of the routes, whenever there is not a boat, or some work is being done.

With the combination of the "LED + CityTouch" energy from Philips, it has been possible to save up to 80% in the electricity consumption of the lighting of the ports. It is also possible to increase the useful life of the LED light and reduce maintenance costs.



Image: 100% lighting level, programmed with CityTouch

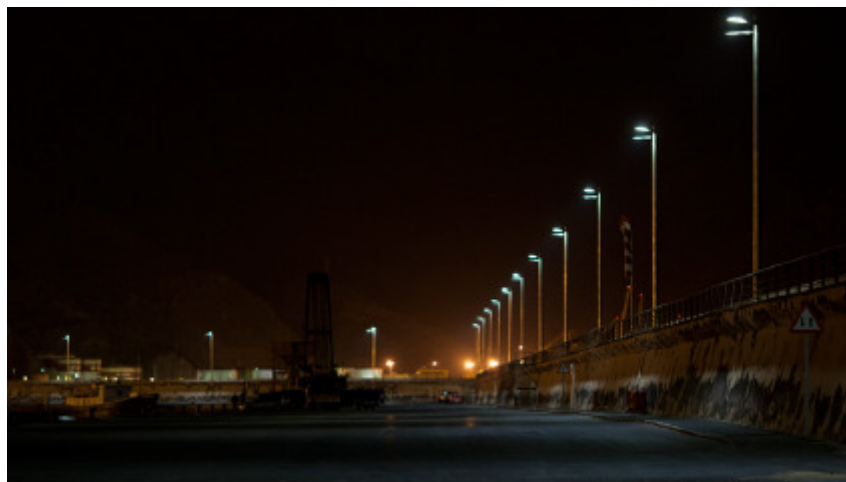


Image: 20% lighting level, programmed with CityTouch

4.5.4.- Budgets of the executed works

Most of these projects are subsidized, through financing for the energy renovation of existing buildings and infrastructures of the General State Administration (ERDF -POPE 2014-2020) with a co-financing rate of 50% to 85%, therefore, it is possible to reduce the costs of the facilities for the Port Authority, while at the same time reducing the amortization time of the LED lighting installations facilities considerably. The Port Authority will take care of the remaining, as the promoter.

Intelligent Public Lighting	Budgets	Grants
Public lighting Port of La Estaca	162.047 €	81.023 €
Public lighting Dock: los Llanos	212.391 €	106.195 €
Public lighting Port of La Gomera	212.150 €	106.075 €
Public lighting Dock: Anaga	271.548 €	
Exterior lighting Port of S/C of La Palma	125.072 €	62.536 €
Public lighting Dock: Enlace	177.462 €	
Public lighting East Dock: Port of S/C of Tenerife	329.734 €	280.274 €
Public lighting Fishing Dock of Port of S/C of Tenerife	304.302 €	258.647 €
Public lighting in Towers with 30 (meters) Port S/C of Tenerife	414.127 €	352.007 €
Lighting Sea station of Los Cristianos	87.967 €	74.772 €
Public lighting Vía Litoral	199.651 €	169.703 €
Lighting of Tunnel Dock: "Enlace"	285.000 €	242.250 €
Public lighting in Port of La Palma	367.105 €	312.039 €
TOTAL AMOUNT	3.148.559 €	2.126.548 €

Table: Budgets projects improvement of energy efficiency

Power consumed by the Public Lighting

Since the SMARTH LIGHTING project was launched, a series of Smart Public Lighting installations have been carried out on the islands of the S/C Province of Tenerife, which has considerably reduced the total power consumed by the company public lighting in the Ports of the Islands and the costs of the production of power.

Lighting provinces S/C of Tenerife	Consumed Power (Kwh)	Costs in the Invoice
2012	2.088.188	279.240 €
2013	1.751.940	243.429 €
2014	1.559.395	200.125 €
2015	1.546.558	200.106 €
2016	1.478.418	196.000 €
2017	1.166.093	155.166 €

Table: Consumption over the years

4.6.- App SmartPort

Application of smartphones to share news and news information between a port and its surroundings: agencies (maritime agents, transitory agents, transport agents, carriers, etc.), cruise passengers and citizens:

- Movements of ships.
- Port facilities.
- Port news.
- Port Meteorology.
- Access to Webcams.
- Availability of recharging points (to reserve with the purchase of the ticket).
- Availability and reservation of carsharing of electric vehicles, electric bike or motorbike.
- Public transport originating in the port and from which they can access the towns/neighbourhoods of interest

SmartPort can be offered without having to deploy any infrastructure in the Port. It is an existing system in the cloud that serves as information to the users of smartphones. The Port Authority sends information to a secure system available in the cloud and all Port users will have instant access to the information.

SmartPort will be available for free in the mobile application markets for iPhone and Android.

4.7.- Communication and sensitivity

The Port Authority of Santa Cruz of Tenerife has different methods to communicate their progress through the Internet. Among them, uses social networks such as "Twitter, Facebook and Instagram" to communicate directly with citizens of the province of Santa Cruz de Tenerife.

One of the objectives of the e-ISLAND Mobility Plan is to communicate and sensitize citizens about the use of new technologies, which will mean an improvement for the environment.

The objective of the Port Authority of Santa Cruz of Tenerife is to join the cause of the "Sustainable Development Goals", carrying out a variety of projects (installation of recharging points, use of electric vehicles, self-consumption facilities, supply of electric power to ships), which will mean a significant environmental improvement in the facilities of the Ports of the Islands.

With the completion of these projects, and the help of social networks, citizens will be notified of the great progress made by the Port Authority and will try to encourage the use of these new technologies to citizens, thus fulfilling the campaign of communication and awareness.

The social networks available are:

- Facebook: @PortsSCTenerife
- Twitter: @PortsSCTenerife
- Instagram: TenerifePorts

5.- Investment and funding source

Project's name	Budgets	Grant Fund	Grants
1.-INSTALLATION OF FAST CHARGING POINTS			
Fast Charging Points S/C of Tenerife	141.388 €		
Fast Charging Points Port of Los Cristianos	125.125 €		
Fast Charging Points Port of S/C of La Palma	59.876 €		
Fast Charging Points Port of La Gomera	50.426 €		
Fast Charging Points port of La Estaca	23.552 €		
2º Phase: Fast Charging Points S/C of Tenerife	81.040 €	MOVALT (60%)	25.026 €
2º Phase: Fast Charging Points Port of Los Cristianos	62.567 €	MOVALT (60%)	32.416 €
2.-INSTALLATION OF ELECTRIC SUPPLY FOR SHIPS			
Electric Supply for Ships Port of S/C of Tenerife	774.809 €	CEF (25%)	154.962 €
Electric Supply for Ships Port of S/C of La Palma	682.831 €		
Electric Supply for Ships Port of La Gomera	438.270 €		
3.- SELF-SUPPLY INSTALLATION			
Photovoltaic for Self-Supply Headquarters Building	212.494 €	FEDER (85%)	180.620 €
Photovoltaic for Self-Supply Tunnel Road Service	104.760 €	FEDER (85%)	89.046 €
Photovoltaic for Self-Supply of Fish Market	119.827 €	FEDER (85%)	101.853 €
Photovoltaic for Self-Supply Fishermen's Association	75.563 €	FEDER (85%)	64.228 €
Mini-Wind Installation Port of La Gomera	111.998 €	FEDER (85%)	95.198 €
Mini-Wind Installation Port of La Estaca	150.000 €	FEDER (85%)	127.500 €
4.-INTELLIGENT PUBLIC LIGHTING			
Public lighting Port of La Estaca	162.047 €	FEDER (50%)	81.023 €
Public lighting Dock: los Llanos	212.391 €	FEDER (50%)	106.195 €
Public lighting Port of La Gomera	212.150 €	FEDER (50%)	106.075 €
Public lighting Dock: Anaga	271.548 €		
Exterior lighting Port of S/C of La Palma	125.072 €	FEDER (50%)	62.536 €
Public lighting Dock: Enlace	177.462 €		
Public lighting East Dock: Port of S/C of Tenerife	329.734 €	FEDER (85%)	280.274 €
Public lighting Fishing Dock of Port of S/C of Tenerife	304.302 €	FEDER (85%)	258.647 €
Public lighting in Towers (30m) Port S/C of Tenerife	414.127 €	FEDER (85%)	352.007 €
Lighting Sea station of Los Cristianos	87.967 €	FEDER (85%)	74.772 €
Public lighting in Vía Litoral	199.651 €	FEDER (85%)	169.703 €
Lighting of Tunnel Dock: "Enlace"	285.000 €	FEDER (85%)	242.250 €
Public lighting in Port of La Palma	367.105 €	FEDER (85%)	312.039 €
TOTAL AMOUNT:	6.373.089 €		2.916.375 €

Table: Investment and funding source

6.- Savings of CO2 emissions

The Port Authority of S/C of Tenerife has carried out a study, with the approximate calculations of the CO2 emissions generated in the different Ports of the Province. A study was made of the CO2 emissions generated by public lighting, vehicles with internal combustion engines, of ships when they are docked at the docks, and of the different areas where self-consumption installations are to be carried out.

Likewise, it calculates the amount of CO2 emissions generated, after the completion of all the projects mentioned above, and those that are about to be developed.

Intelligent Public Lighting	CO2 emissions without a Sustainable Electric Mobility Plan	CO2 emissions with Sustainable Electric Mobility Plan
	645.250 kg CO2/year	360.320 kg CO2/year
Fleet of Electric Vehicles	CO2 emissions without a Sustainable Electric Mobility Plan	CO2 emissions with Sustainable Electric Mobility Plan
	25.620 kg CO2/year	0 kg CO2/year
Installation of Electric Supply for Ships	CO2 emissions without a Sustainable Electric Mobility Plan	CO2 emissions with Sustainable Electric Mobility Plan
	14.855.520 kg CO2/year	0 kg CO2/year
Self-Supply Installations	CO2 emissions without a Sustainable Electric Mobility Plan	CO2 emissions with Sustainable Electric Mobility Plan
	431.936 kg CO2/year	215.462 kg CO2/year
SUMA TOTAL:	15.958.326 kg CO2/year	575.582 kg CO2/year

Table: Savings of CO2 emissions.

In total, the **CO2 emissions to the atmosphere avoided is 15.382.744 Kg CO2/ year** which means a reduction of more than **85% of CO2 emissions**.

7.- Planning of the Sustainable Mobility Plan

Phase 1: ORGANIZATION AND START OF THE PROCESS	25/07/18
1.1. Promotion of the initiative. 1.2. Establishment of the work plan. 1.3. Definition of the plan and characteristics.	
Phase 2: PREDIAGNOSIS AND GENERAL OBJETIVES	25/07/18
2.1. Prediagnosis. 2.2. General objectives.	
Phase 3: ELABORATION OF THE PLAN	16/09/18
3.1. Definition of specific objectives. 3.2. Selection of measures 3.3. Definition of indicators 3.4. Definition of scenarios 3.5. Definition of the strategy to follow 3.6. Drafting the plan 3.7. Search for information	
Phase 4: PUT INTO PRACTICE	from 25/10/18 to 25/10/20
4.1. Public participation 4.2. Implementation of the action plan	
Phase 5: MONITORING, EVALUATION AND CORRECTIVE MEASURES	from 25/10/18 to 25/10/20
5.1. Monitoring based on indicators 5.2. Evaluation 5.3. Corrective measures	

Table: Planning of the Sustainable Mobility Plan

8.- Tracking indicators

8.1.- Plan Updates

It is essential to follow up, reinforcing those aspects that require it and establishing solutions for problems that arise. Therefore, for the evaluation and improvement of the activities of the Plan, the following monitoring indicators will be used:

Environmental indicators:

- Energy consumption per recharge point: kWh / month.
- CO2 emissions avoided: tCO2 / year.
- Production of energy from the photovoltaic installation: kWh / month.
- Energy production of the wind power generators: kW / month.
- Carry out an energy management system (Certification ISO 50001).

Social indicators:

- Followers in social networks: number of people.
- App: Number of users

Economic indicators:

- Economic savings for using electric vehicles compared to conventional: € / year.
- Economic saving that would suppose to the shipping companies to turn off their motors and connected to the electrical power of the port
- Economic savings on electricity bills.

8.2.- Energy management system (ISO 50001 Regulation)

An energy management system (SEG), within the management of an organization, is the part destined to develop, manage and implement its energy policy, managing activities, products, or services that interact with the use of energy.

The ISO 50001 standard makes international reference in the field of energy management systems. It is a voluntary standard, which establishes the requirements that Energy Management systems must have, in order to make continuous and systematic improvements in energy efficiency.

The SGEs in accordance with ISO 50001 is certifiable. With these certifications, the organizations that have bet to implement an energy management system are introduced, with the implementation of renewable energy use, systematization of energy processes and the search for coherence with the corporation's energy policies.

Objectives

The Port Authority aims to implement UNE-EN ISO 50001, in the facilities and processes of the Ports of Santa Cruz of Tenerife. To do this, the following steps are marked:

- Structure, write and integrate the different procedures associated with the ISO 50001 standard.

- Carry out external audits of certification of the SGE.
- Make a resolution of the possible nonconformities detected in said audits.

All this aims to achieve a positive certification of the SGE.