



Sustainable Edification

CIRO PROJECT



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ABSTRACT

Throughout this project we are going to explain the importance of creating a sustainable city. Also, we will deal with some topics of great importance like environmental backgrounds, that can be influenced both negatively and positively when creating a city with sustainable characteristics. Then we will continue exposing a detailed description of the project and explain the different key points that need to be taken into account to build the sustainable city.

Next, we will offer a list with each of the objectives that we have regarding this project, which will acknowledge what we want to achieve within this project. In addition, we have thought of a series of innovative aspects that will be very beneficial to the project.

Finally, we have made a conclusion which contains an overview of our project, as well as what we expect from it.

We hope that our proposals can be effective and of great help, since we are aware of the importance of starting to plan the construction of sustainable cities around the world.



INTRODUCTION

This work deals with the theme of sustainable cities that will provide a reduction of the negative impacts of the environment by facilitating a better quality of life. To be able to make this project we will need a previous planification and a good economic and social status, because the construction of this city will involve many expenses and afterwards will need to be properly maintained. Also, we have to keep in mind the importance of the weather and the area where it will be located. These factors are important because depending on the place and the climate, the city will have greater or fewer number of facilities.

Although there are a large number of cities in the world, sustainable cities only occupy 3% of the Earth's surface. Because the percentage of these cities are very small, the carbon emissions are around 75%. Also, the cities consume around 60% and 80% energy in a year. In addition to this revealing data, we know that the world population is increasing considerably. In 1950 the world population was 2.6 billion people; However, a study carried out by the UNO shows us that in 2015 the world population has reached 7.3 billion people. This data shows us that in the next generations the world population will continue to increase.

Therefore, we must start thinking about the idea of building sustainable cities, because as the population increases, so will carbon emissions and energy consumption.

In the future if we have a large number of sustainable cities, these cities will help us even if there is a greater population because the carbon emissions and air pollution will be less.

The creation of a city with these characteristics would mean protection for the planet, a guarantee that all the people could enjoy peace and prosperity, and even end poverty. It could also mean quality education, improved ocean life, decent jobs and economic growth, as well as a reduction in inequalities for the world. For all this to be possible, great involvement is needed by the governments, private sectors, civil society and citizens all across the world. Everyone must do their part and collaborate, as this is a process that we have to carry out together.

The main idea of our project is to be able to build a sustainable city where all the needs of citizens can be covered and in which the care for the environment is also taken into account. Furthermore, we have planned a series of ideas that we think will be useful to make this project possible, such as the installation of solar panels in buildings, changing of lights and electrical appliances, installation of light and water sensors, waste separation and hydrogen generators to supply hydrogen. In our opinion, in order to carry out a sustainable city it's essential to make the actions mentioned above come true as it would mean less energy consumption for the sustainable cities.

To do this project successfully, it is necessary to set a series of objectives from the beginning which will help us have clear ideas of our goals. The main purpose of the project is to acquire new knowledge of climate change, renewable energy and energy storage systems. In addition, we would like to show society the importance of hydrogen as an energy source in the future. We have made a list with targets of the project, which improve the efficiency of batteries and hydrogen engines.

Apart from everything mentioned above, we have thought of some very innovative aspects for the present society. Among these ideas we highlight the presence of rooftop gardens, that will help the reduction of CO₂ that is emitted to the atmosphere.

Although the creation of a sustainable city requires a great effort, it will be of great advantage for society because it will produce a better quality of life for all.

Lately there has been a lot of discussion about the concept of sustainability as it is one of the fundamental keys for the development and advancement of humanity and its future. For this reason, an increasing number of cities are working to achieve a sustainable way of living, development of new measures as well as carrying out activities that imply an improvement for the environment.

We must raise awareness of the importance of taking care of the environment, because we won't have a healthy society if the human race destroys the environment.

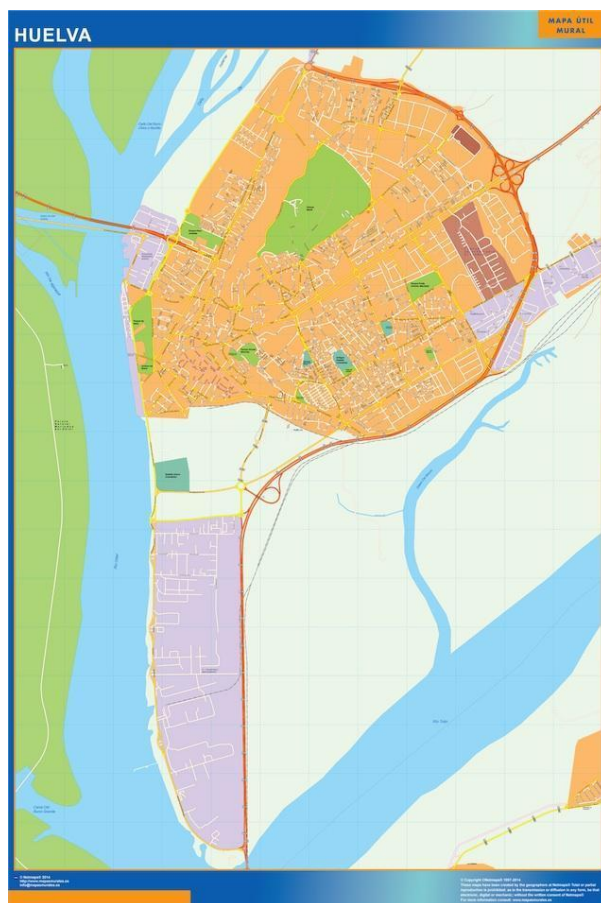
ENVIRONMENTAL BACKGROUND

Our city will be located on the coast, specifically in Huelva, which is a windy and sunny area by the sea. These elements are essential to produce solar and wind energy for the creation of our sustainable city.

Huelva is a port city located in the southwest of Spain, where the rivers Tinto and Odiel flow,, which belongs to the Guadiana basin. It has a Mediterranean climate, where summers are hot and dry with temperatures above 22°C.

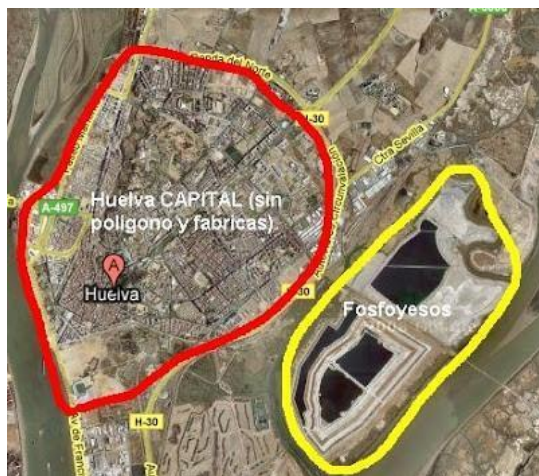


Our city has a population of 146.318 citizens, according to the municipal register. The city is divided into 48 neighborhoods. The economy is based on two fundamental pillars: the production from factories and the service sector. Moreover, the Port of Huelva is one of the most active, competitive and growing ports due to its strategic location for trade with Africa. It is divided into two sectors: the inner port, located in the city, and the outer port, which is the main and provincial port.



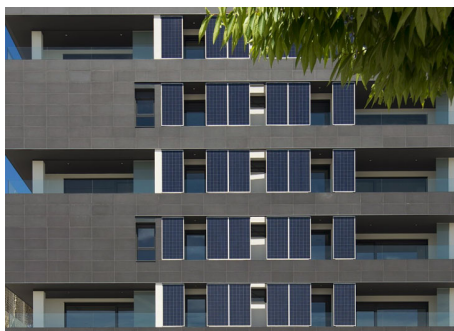
If we look carefully at the zone where our sustainable city would be located, we realize that there are numerous factors that would be beneficial and help

us in regards to the construction and maintenance of the city. One of the main factors that would be beneficial to the creation of our city is the climate and weather within our region . The Juan Carlos I Breakwater is 13 km long wich will be useful in the installation of wind turbines along its entire length; this breakwater has intense wind that would allow us to perfectly install 75 MW of wind energy. Similarly, the Rincón marshes are currently occupied by phospho-gypsum waste from the company Fertiberia, if this waste could be regenerated to install a photovoltaic park on the 1200 hectares the waste company occupies, at least 500 MW of photovoltaic energy could be installed. The purpose of these facilities would be to supply electricity to the city and obtain green hydrogen that would be used in time of low energy or for fuel cell vehicles.



DESCRIPTION OF THE PROJECT

We have based our project on meeting the basic needs of the citizens of a city, making sure to preserve the environment and to make use of renewable energy. To do this, we have developed some key points that would allow us to build a sustainable city.



In the first place, the installation of solar panels on the roofs and southern facades of buildings, which are the areas that are most exposed to the sun, so the use of this solar energy will help us supply energy to the building. and have enough storage for days with less sun.

In our sustainable city, the use of LED lights will be implemented in homes and public buildings, since they represent the saving of energy and eliminate the use of mercury or other polluting gases. In addition, LED lights have a longer life duration than other lights, and as well they are safer for the environment.



On the other hand, we will also promote the use of A+++ appliances, since the investment in these typically lead to much higher savings for household energy consumption.

Furthermore, another one of our proposals would be the installation of sensors for the presence of water and light; these are electronic devices that detect movements in the area where they are installed. These light sensors work with infrared light and detect human presence, therefore they will allow the light to be turned on exclusively when there is a person and it is necessary, thus the energy expenditure is much lower. On the other hand, the water sensors work with the same mechanism and thanks to this method, water will no longer be wasted. In our city we will install these mechanisms in public spaces and buildings such as schools, hospitals or shops among others, in addition to promoting that citizens use them in their homes.

The purpose of the motion sensor lights are to promote citizen awareness, thus rewarding those citizens who commit to environmental care. In our city, less fees and taxes will be paid if more is recycled and less amount of waste is generated. For this, we will install door-to-door waste collection to identify citizens, and a container for public use that can only be opened with personal identification.



We want hydrogen to be one of our main sources of energy, as we consider it the future of society. Hydroelectric plants are hydrogen generation systems that in a short time can convert any engine into a system between 75-80% less polluting than any other with another source of energy. In addition, the use of hydrogen improves efficiency because it can produce up to 50% less fuel consumption. In our city we would like to promote the use of hydrogen as fuel for public transport. Therefore, it is necessary to install hydro generators to reduce the impact of pollution in the atmosphere and install these in spaces that will allow, for example, buses to recharge fuel.



OBJECTIVES OF THE PROJECT

The main objective of the CIRO project is to acquire knowledge about climate change as well as skills in renewable energy and energy storage systems.

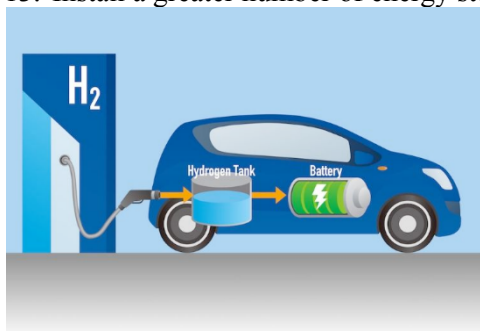
Our main objectives are:

1. Contribute to the development of renewable energies.
2. Contribute to the reduction of polluting gases.
3. Promote initiatives that contribute to the implementation of renewable energies.
4. Develop activities to inform and raise awareness among the population.
5. Turn our city into an example of sustainability.
6. Improve the quality of life of citizens.
7. Take advantage of natural energy sources such as the sun or the wind among others.
8. Generate and store energy in urban areas.
9. Offer citizens a guarantee of performance and greater investment in sustainable appliances.



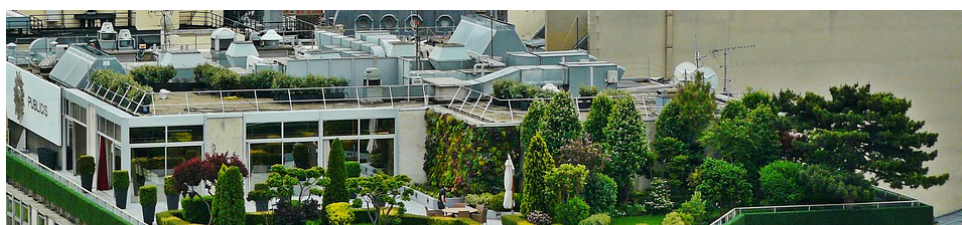
As we mentioned above, we attach great importance to the use of hydrogen as an energy source since we think that it is the future of our society. This energy is considered clean and efficient energy. Our objectives in this area are:

10. Public transport in our city to work solely by hydrogen supply.
11. Convert our city into a 100% sustainable city, since hydrogen does not emit polluting gases.
12. Improve the efficiency of batteries and motors that are supplied with hydrogen.
13. Install a greater number of energy storage sources, since hydrogen is very easy to store.



INNOVATIVE ASPECTS

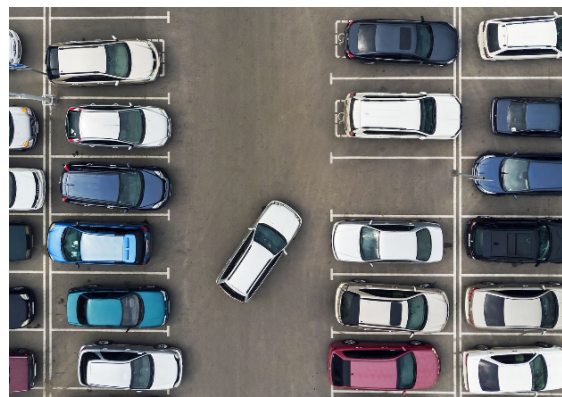
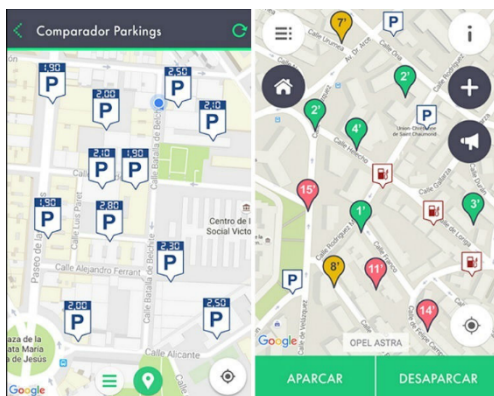
The sustainable city must be effective and provide new services, that will contain efficient and durable infrastructures of water, electricity, telecommunications, gas, transports, security and emergency services...



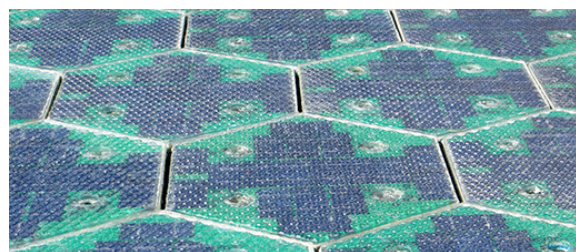
These services must be aimed to improve the comfort of the citizens and above all, respect the environmental aspects, maintaining a wise use of the non renewable energies. All of our buildings will have rooftop gardens; These gardens will help to reduce the CO₂ emissions that are being emitted daily and fight against urban pollution that has been causing a great number of citizens deaths. The presence of plants in the tallest building areas will help us reduce the 50% of CO₂ that is emitted into the atmosphere. They will also create an awning effect that will isolate the building so the house in the summer is cooler, and in the winter is isolated from the cold. Thanks to these measures, we can save 30% in energy costs of the air conditioning of these buildings.



One of the most important causes of pollution is urban mobility, which is the reason why a lot of cities are responding with a strong restriction of traffic within their urban area, but this alone is not enough to improve the environment. Almost 30% of registered traffic within cities comes from vehicles seeking parking, which emits approximately 50 million tons of pollution in the European continent every year. To reduce search times for parking spaces, we must use technological developments such as mobile devices in which we can download apps to access services for our own needs as well as entertainment. In this way, our sustainable city will have an application that will inform you of the free spaces in the areas near you, both on the street and in public and private car parks, saving people time and money as the application will include the prices of parking spaces. Not only will this application save people time and money, but it will also save the environment from the CO₂ that is emitted from their vehicles into the atmosphere.



Finally, our city will have a solar road made of transparent concrete that contains wireless charging panels. This infrastructure will be made up of three layers. The first is made of transparent concrete, which has properties similar to conventional ones. This material offers the proper friction for vehicles and protects the second layer, in which the solar panels are located with a coating that supports the weight of a truck. In addition, it contains wireless charging panels for electric cars. The deepest layer serves to separate and protect the panels from the wet earth and to route connections and wiring.



CONCLUSION

Given the worrying situation with global climate that we are experiencing, we call on all cities that do not care for their surrounding environments and have behaviors that harm different ecosystems, where a large number of different species live and that cause detrimental effects on other living beings of the planet.

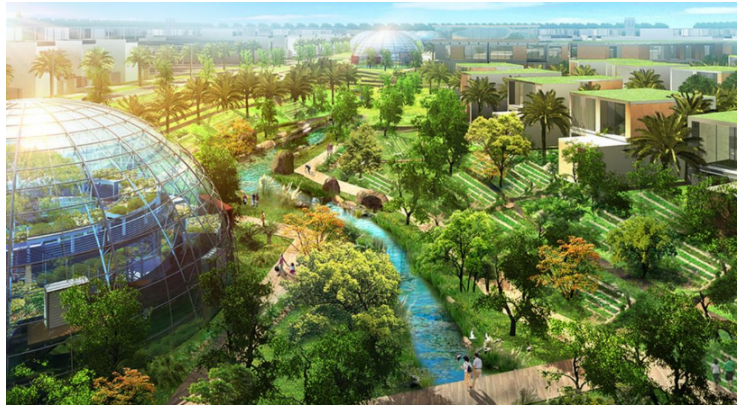
The most common problems are congestion, lack of funds for basic services, the absence of appropriate policies on land and housing, and the deterioration of infrastructure.

Sustainable cities ensure access for all to acquire housing and basic services, along with a safe and affordable transport network. They pay special attention to air quality and the management of waste generated in cities. For this reason, sustainable cities favor the creation of green areas and public spaces, thus protecting cultural and natural heritage, as well as reducing the number of deaths caused by natural disasters.

Hydrogen will be of great importance in the future, as it will become the main energy source for transport. In the transport sector, hydrogen-powered vehicles have a large storage capacity compared to electric batteries, which allows hydrogen technology greater autonomy. Furthermore, the recharging of hydrogen vehicles is faster and is carried out in hydrogenated plants, which are being installed in different places across Spain.

The expansion of ICT, or Information and Communication Technologies, across the world, has created an unstoppable process in which new technological applications are appearing that continue to satisfy and motivate human beings and companies to make use of them. The use of technological development will help us generate sustainable cities and improve the lifestyle of citizens, as well as increase their life expectancy rate.

Many cities have set goals to improve themselves in a sustainable way, but for these to occur, citizens must commit to sustainability as well. If these sustainable goals are followed through, cities will continue to be an economic and progressive engine, without destroying or deteriorating the natural resources that the environment offers us.



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CIRO courses notes