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Environmental and Territorial Management and Planning in Calvià

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ABSTRACT

The great development Mallorca suffered in the 20th Century affected especially a municipality whose population has been multiplied by twenty in a hundred years and consequent consequences, such as unlimited growing real estate and the unsustainable exploitation of the natural resources. This is the case of Calvià.

The thesis aims to evaluate the commitment of the municipality to the environment and whether it is heading to the best possible scenario or not. In this work, the political action of the municipality is studied by doing a case study using quantitative and qualitative methodologies in the territorial planning, transport, energy, water and waste management of Calvià and its successes and failures are assessed.

In addition, an environmental benchmarking is done between Calvià's initiatives and the ones proposed by the Urban Agenda for the EU and La Palma and Culatra Island which have proved to be committed to the environment. Finally, the proposals that could lead the municipality to improve the current situation and therefore be more sustainable are highlighted.

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INTRODUCTION

We are facing a crucial moment in the history of the environmental advocacy. Recent natural disasters such as the fires of Australia for months, the worst ever locust invasion in Kenya, the switch of the capital city of Indonesia because Jakarta sinks or, here in Spain, the appearance of thousands of dead fishes on the shore of Mar Menor are just some examples of the consequences of climate change and human environmental footprint in year 2019, which set up a new reality in our societies. People more than ever is especially concerned about the topic, mainly the youth. It is shown in the emergence of social mobilizations all around the world protesting for the environment, criticizing the lack of political action and defending more ambitious objectives in the political agenda according to the scientific community recommendations.

A first step to address the situation described is to start with small things we can change and when enough things be done the inertia will drive us to meet the objectives proposed. This first step forward means to dig down into the local policies in order to know what's being done. The topic on which this thesis is based, the environmental and territorial management and planning in Calvià, deserves to be researched since the municipality has suffered a great development in the recent years. It brought an alteration to the 20th Century situation according to the population, resources consumption and transport which led to issues which must be addressed such as the greenhouse gas emission and the water and waste management.

Calvià is the second most inhabited municipality of Mallorca and the most touristic one, which is a proof of its chance to cause a great impact if proper policies are implemented and if there is an actual commitment by the local authorities in the environmental area. Consequently, on one side, Calvià is able to carry on big projects and on the other side, their effects can easily be recognised in the island.

This is a very wide topic which could be approached in many ways, and there are some reasons why the focus is put in the local policies. This first one is because it's in the municipal council where measures are tailor-made, knowing better than anybody what the situation is and providing a specific solution for it. The second motive is that because of the length of the thesis, it will represent in a more complete and accurate way the reality of the area described if it's a municipality rather than a region or a country. According to the decision of having chosen the environmental and territorial management and planning, there are some reasons for it. Firstly, environmental management is essential not only to

implement policies that benefits directly the environment of the municipality, but also to create goals, such as the ones set up in the Paris Agreement, which will guide the council to coordinate all its departments to achieve them. Secondly, territorial planning is the field with the biggest environmental responsibility in its hands. In first place, it decides how many residential and touristic seats are in the municipality with their corresponding energy and water consumption and waste generation among others. In the second place, it controls the soil distribution, not only how many hectares are meant to be urban or rural land, but also how is going to be used the urban land. Finally, the transport is highly influenced by the territorial planning since it manage the communication of the municipality by its roads. (Josa, J., s.f.).

CONTEXTUALIZATION AND OBJECT OF THE THESIS

Nowadays Calvià is the second municipality with highest population in Mallorca, with 50.559 inhabitants, behind Palma and the most touristic one with more than one and a half million tourists per year (Institut d'Estadística de les Illes Balears, s.f.). But it wasn't always in this way. In order to understand the actual situation, it is essential to have a look into the background of the municipality. At the beginning of the XX Century, Calvià's main activity was the agriculture and the population were around 2.500 inhabitants. It was in the 60's when tourism started to grow jumping from 6.800 seats to 120.000 in 1997. This rise of tourism activity necessarily implied an increase in the population to meet the needs of labour force. One of the main reasons that drove the municipality to become in what it is, was its natural heritage, in on side composed by 54 Km of coast with 34 beaches, countless *calas* and marine reserves such as Malgrats Islands, and in the other side the mountainous area of the *Sierra de Tramuntana* which is UNESCO World Heritage.

In response to these changes in the municipality appeared the **Calvià Agenda Local 21** (Prats, F., 1997) in the year 1997, which describes the tourism development as improvised, with a short-term vision, based on an unlimited growing real estate and the unsustainable exploitation of the natural resources. This project aimed to meet the goals proposed in the Rio de Janeiro Earth Summit and the Fifth Environmental Programme of the EU. For first time in the municipality there was a plan which considered the environment as a central issue and it certainly involved positives changes in Calvià compared with what had been done previously. In the following years until the present, some other important actions were taken.

Pushed by the Calvià Agenda Local 21, was created a new General Urban Planning Plan in the year 2000 (**PGOU 2000**) (Dañobeitia, J., 2000), which contained the objectives and aspirations of the agenda. In the year 2006 there was a modification of it, which will be named from now on as **MPGOU 2000** (Dañobeitia, J., 2006). It was strongly focused on the territorial planning, following the guidelines of the Agenda Local 21 and addressing important issues for the municipality such as the Passeig Calvià, *esponjamiento* of certain plots of urban soil and the future of the road C-719 which connects Calvià's urbans center among them and with Palma.

Five years later, in 2011, Calvià joined the **Covenant of Mayors**, committing itself to implement the EU's climate and energy objectives, which meant a CO2 reduction of 20% by the year 2020. The big proposal was the end of the heating oil dependence with the implementation of the natural gas since Mallorca is connected with the Spain natural gas network since 2012. Three documents were developed in order to meet the goal, *Estrategia Calvià por el clima 2013-2020* (Strategy Calvià for the Climate), *Plan de Acción para la Energía Sostenible de Calvià 2013-2020* (Action Plan for the Sustainable Energy) and Report of emissions in Calvià from 2007 to 2014 (Rodríguez, Salguero, & Rigo, 2012).

Finally, there is an *Advance* of the PGOU in the year 2017 (Rodríguez, A., 2017) (**APGOU 2017** from now on) which proposes certain updated measures and objectives in order to address the current issues of the municipality. It sticks together with the Sustainable Development Goals of the United Nations and suggests some projects of a big interest to the municipality such as the Triangle of Ses Planes in Palmanova, the expansion of the industrial estate of Son Bugadelles and the Great Magaluf wetland environmental park. It's important to mention that the APGOU 2017 by the moment is a declaration of intent and does not legally bind the local government to any of the proposals made.

With this whole situation there are two research questions that guide this thesis:

- **¿Is there an actual commitment of the municipal council to the environment? And if it is the case, ¿is it doing its best?**
- **¿Where should it head from now on?**

In order to answer these questions, the above mentioned issues the municipality has faced since the implementation of the Agenda Local 21 are analysed; the major actions the municipality has taken are reviewed, paying special attention to the territorial planning, the transport, the energy and water consumption and the waste management; and finally a research is made as a way to find potential policies to implement in Calvià, based on tools the European Union provides, such as the Urban Agenda for the EU, and two cases of urban areas which set ambitious environmental objectives and developed an Agenda in order to meet them.

Finally, by following up the work made in Calvià in the last twenty years facing the environmental impact caused by the development of the municipality, this thesis aims to find out if the municipal council:

- is actually committed with the environment
- has always based its decisions considering the environmental impact as a priority and if not show them up
- has met the objectives presented
- is taking the right path from now on (Josa, J., s.f.)

METHODOLOGY

Since the aim of the thesis is to prove the commitment and action of Calvià municipality with the environment by tracking its evolution in the last twenty years, the research strategy that will be used is an **illustrative case study**, considering that the action of the Municipal Council in the context of environmental management and territorial planning will be studied and the situation will be described.

“Illustrative case studies. These are primarily descriptive studies. They typically utilize one or two instances of an event to show the existing situation. Illustrative case studies serve primarily to make the unfamiliar familiar and to give readers a common language about the topic in question.” (Wikipedia, 2020).
The method chosen to gather information in the thesis is a mix between **quantitative and qualitative design.** We will use the quantitative information in order to compare the former situation of the municipality with the current one. Among these data we include, for example, tonnes of CO2 gas emission, hectares of urban land or Kwh of energy consumption. They will also provide us the possibility to get more concrete conclusions about the measurable goals. According to the qualitative information, it will compose the part of the thesis related to the non-measurable information such as the non-numerical objectives, the impacts of certain policies and the actions implemented.
The thesis will be based on bibliographic information. Firstly, the section of “Results” will describe the situation of Calvià in the last twenty years according to three different scopes: territorial planning, transport and resources. Each of them will be described relying on the information provided by the Agenda Local 21 of Calvià, the modification in 2006 of the General Urban Planning Plan of Calvià (*MPGOU2000*) and the *Advance* of the new General Urban Planning Plan in 2017 (*APGOU2017*). In addition, the energy consumption section will use the information of the documents agreed in the Covenant of Mayors in one of its points and the same will be done in the water consumption and waste generation with the data of Calvià 2000 S.A. Secondly, the comparative study will be based on two pillars. The first one is the Urban Agenda for the EU and its respective action plans. The second one will give two examples of urban areas committed with the environment thanks to the Clean Energy for EU islands initiative.
The thesis will be divided in two parts: results and comparative study.

- The **results** will describe five different topics following the same structure. These are the territorial planning, the transport, the energy consumption, the water consumption and the waste management. The structure will be the following: (1) a small introduction to the topic with a rhetorical question ; (2) a table where the main goals and initiatives will be shown; (3) each of them will be divided in three or four sections according to the main source of information; the main ones are Agenda 21, *MPGOU2000* and *APGOU2017*; (4) some conclusions of the performance of the municipality in this topic.
- The **comparative study** will introduce in the first place the Urban Agenda for the EU and lately will go deepen in its four action plans, which are: the Climate Adaptation Partnership (Unknown author, 2018), the Circular Economy (Unknown author, 2018), the Energy Transition (Unknown author, 2019), and the Partnership for Urban Mobility (Unknown author, 2018). Secondly, it will be explained what the Clean Energy for the EU islands is and later two cases of islands which joint this initiative, La Palma (Unknown author, 2019) and Culatra (Unknown author, 2019). Finally, there will be a discussion where the solutions proposed in the comparative study will try to match with the issues described in the results section.

The last part of the thesis will be composed by some final conclusions in which the performance of Calvià municipality in the last twenty years will be reviewed and the research questions will try to be answered. (Barcik, R., s.f.)

RESULTS

The following results are divided into **territorial planning, transport, energy, water** and **waste** and aim to answer both research questions.

TERRITORIAL PLANNING

The great development of the municipality during the 20th Century could not stand due to it was heading to the collapse. The *Agenda 21* started leading the new Century, however, ¿Is Calvià taking the proper path? Or, ¿Is it committing the same mistakes?

Agenda Local 21

Goals: reduction of 1.348 Ha of developable land
Initiative: five years moratorium in significant coastal constructions and implement the declassification developable land in the PGOU 2000

The main goal described in the *Agenda Local 21* of Calvià was for the *PGOU* to keep the declassification of 1348 has of developable land in order to ensure the sustainability of the municipality through the *PGOU* and it proposed a five years moratorium in the significant constructions on the coast.
In the *figures 1* and *2* we can see the evolution of the urban development in Calvià since the year 1991 to 2009. The starting point in the year 1991 was 2.396 Ha of urban land which was slightly reduced in the year 2000 to 2.372 Ha. However, the rural land changed abruptly, from 10.240 Ha in 1991 to 11.981 Ha in 2000. The reason for this fast retreat was the Agenda Local 21, which set up the goal of a reduction in the developable land of 1.350 Ha and asked to implement it in the *PGOU 2000*. The figure shows this drop of the developable land from 1.736 Ha (455+76+1.205 Ha) in 1991 to 19 Ha in 2000.

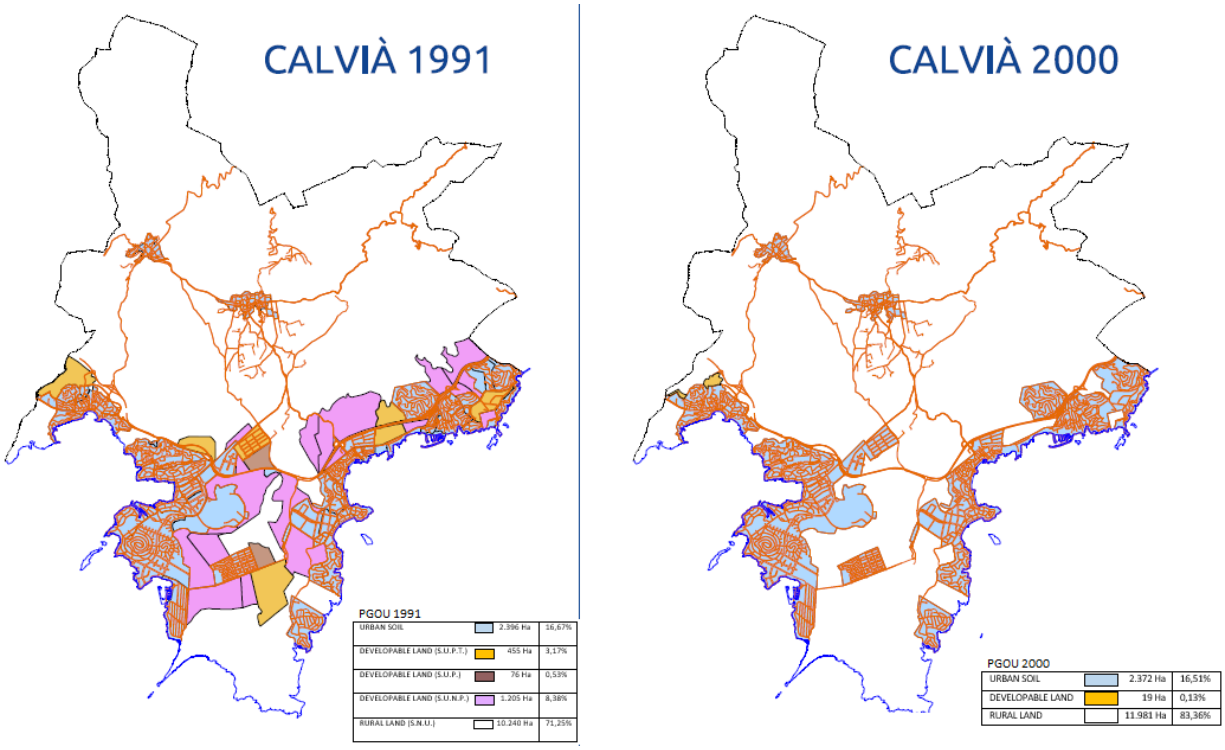


Figure 1. Territorial Planning. Calvià 1991-2000 (Source: www.calvià.com)

The difference between the years 2000 and 2009 is not so big. The urban soil is exactly the same, and the rural land has decreased in the 2009 by 57 Ha as a result of the rise of the developable land from 19 Ha to 76 Ha. This climb in the developable land correspond to the area of the industrial estate of Son Bugadelles and a small area in Costa den Blanes-Portals Nous.

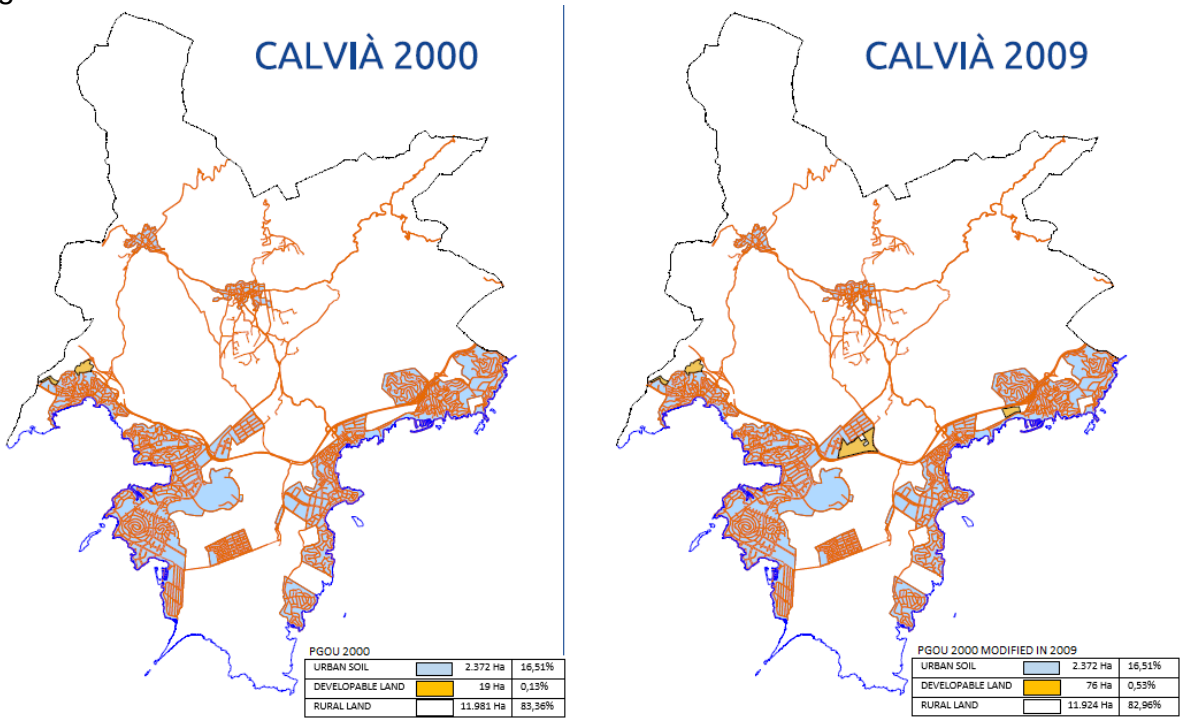


Figure 2- Territorial Planning. Calvià 2000-2009 (Source: www.calvia.com (Unknown author, s.f.)

MPGOU 2000

Goal: reduction of urban development land and the comprehensive rehabilitation of the coastal space
Initiative: urban intervention proposals and *esponjamiento*

The first objective proposed is a substantial reduction of the land meant for new urban development, as well as the rehabilitation respecting the limits presented in the *Agenda Local 21*. In order to meet this goal, the first guideline to follow is the definitive exclusion of the urbanization process of most of the urban land declassified as a precautionary measure. In addition, the declassification of 1,348 hectares is proposed, which become protected rustic land. The second guideline suggested is the enhancement and expansion of rural land in order not only to restrict urban development, but also to moderate the consumption of resources that derives from it.
The second objective that the *MPGOU 2000* includes is the comprehensive rehabilitation of the coastal space. The guideline which aimed to meet it was the urban intervention proposals, mainly related to public space, but also considering the *esponjamiento* (activity which consists in the wrecking of an obsolete building in order to create an area of public interest) of certain plots of urban soil. The *esponjamiento* was one of the most ambitious goals in the Agenda 21 due to the instant positive impact it causes in the area, but it had strong difficulties such as the high cost.

APGOU 2017

Goal: giving a better use to the developable land than the current one and than potential future projects
Initiative: *Ecobarri* Son Bugadelles, Dry marine Son Bugadelles, Natural Park Magaluf marine, Ses Planes triangle and some other projects

The revision of the *PGOU* in 2016 (Unknown author, 2016), stated the guidelines of the *APGOU 2017*. It defended that the goal of the revision is not changing the existing development model in order to try to recover the situation of the municipality before its urban development, but the objective is to act in the existing territory lowering the consequences of the previous model.
The revision criticizes the differences between the regional and local government since the position of the Government of the Balearic Islands with the *Llei Turística* (Unknown author, 2012) (tourist law) has always been in favour of the tourism growth, countering any proposal to restrain the growth or lower the tourist seats of the municipality. Especially for this reason, the municipality assumes the growth is unavoidable and its position is to take measures in order to reduces its impact.

Some of the most significant actions included in *APGOU 2017* are located in the *figure 3* and later described one by one:

Figure 3. Territorial planning. Map of APGOU 2017 actions. (Source: IDEIB, s.f.)

- ***Ecobarri* Son Bugadelles**: the construction of an environmentally friendly residential area in Son Bugadelles which appears in the *figure 4*. This proposal has been put on the table for years, however not been implemented yet. It includes some measures considering the environmental impact:
  - Guarantee sustainable mobility that allows accessibility and internal mobility, mainly in non-motorized modes and transport public.
  - Implementation of renewable energy
  - Use of efficient lighting systems
  - Provide charge point for electric vehicles.
  - Integrate urban drainage systems (SUDS)
  - Integration of water consumption minimization systems
  - Develop waste management infrastructures
  - Prioritization of regional materials and reused, recyclable and renewable materials.
  - Construct buildings with energy efficiency certificates
  - Green spaces

Figure 4- Territorial planning. Ecobarri Son Bugadelles. (Source: APGOU 2017 and IDEIB, s.f.)

On September 2013, Eugenia Frau, Deputy Mayor for Urban Planning of Calvià, was asked in an interview in *Diario de Mallorca*, about the project of the Son Bugadelles triangle extension despite the opposition of the neighbourhood (Moure, "La ampliación de Son Bugadelles está parada; si se hace algo, será con el consenso de los vecinos", 2013). She answered that new equipments were planned to be built in there. One year later, the same newspaper explains that the Municipal Council was going to be forced to include in its review of the *PGOU* a 50,000 m2 land classified as an area of protection from erosion risks and for this reason the extension of the industrial estate was going to be stopped. The article says this inconvenience is a “breath” for the neighbourhood (Moure, La ampliación de Son Bugadelles, paralizada a la espera de su revisión, 2014). A more recent article of *Ultima Hora*, in March 2017, presents the above-mentioned project of the *Ecobarri* Son Bugadelles, in which the mayor Rodríguez Badal defends that the new buildings must comply with environmental and energy sustainability parameters (Aguiló, 2020).

- **Dry marine of Son Bugadelles**: *APGOU 2017* proposes the construction of a dry marine in a developable land area in the industrial estate of Son Bugadelles, in the area shown in the *figure 5*. It describes it as an environmentally friendly proposal despite its industrial use. The environmental measures proposed are:
  - Energy efficiency in the new installations
  - Construction of a photovoltaic solar cover of the entire available surface

As previously mentioned, the extension of Son Bugadelles has been on the agenda of the municipality for years and at the beginning it didn’t considered two projects as it does now, but only one. The GOB (Grupo Ornitológico Balear), in *Diario de Mallorca* in 2009, showed its discontent with this project. It criticized the intention of the municipality to build a new commercial city, which would overload the existing infrastructures of Calvià, especially the roads (Efe, 2009).

Figure 5- Territorial planning. Dry marine Son Bugadelles. (Source: IDEIB, s.f.)

- **Natural Park Magaluf marine:** the creation of a natural park in an area that contains rural land and false urban land. Some measures accompany this proposal:
  - Preparation of a natural park management plan
  - Define a zoning that delimits shelter areas for fauna and flora
  - Landscape integration of the new buildings
  - Artificial lagoons must meet green design criteria to improve the quality of surface and groundwater

In the *figure 6*, we can see the above explained Natural Park Magaluf marine, in the area contained into the read lines, which plans to be located where the karting currently is and where the Aquapark used to be and will be composed by a new lamination raft. In the *figure* 7, we see some positive measures for the environment accompany this action as the suppression of the Cami de Sa Porrassa, the wetland recovery and the naturalization of the sea front. However, the provision of other projects such as the commercial touristic zone or the protected housing does not follow the same goal.

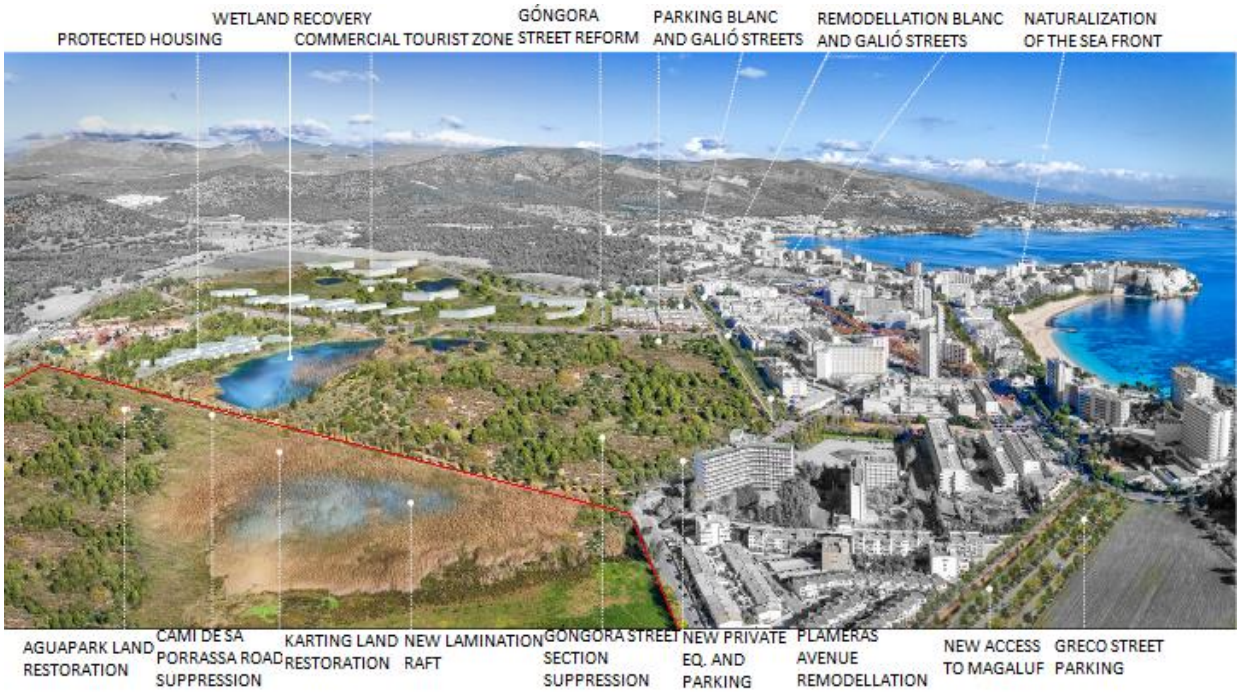


Figure 6- Territorial planning. Natural Park Magaluf marine currently. (Source: APGOU 2017)

Figure 7- Territorial planning. Natural Park Magaluf marine project. (Source: APGOU 2017)

- **Ses Planes triangle:** the deployment of community and commercial equipment as. The current situation appears in the *figure 8* while the one with the project performed in the *figure 9.* Some measures that it includes are:
  - Landscape integration of the buildings
  - Improve the quality of public space
  - Green roofs
  - Integrate urban drainage systems (SUDS)

- Energy efficiency qualification higher than “B” in the new installations
- Promote non-motorized connection with the urban area

The area of Ses Planes triangle was rural land until the modification of *PGOU* in 2013, now a days it is considered developable land directly ordered. The environmental study of Ses Planes triangle made when *PGOU* was modified in 2013 explains the area is composed in its majority by an inactive agricultural area of carob and almond trees and a small area with some pine trees. A small part of the area has already been used for public means: the health centre of Palmanova, the tax office of Calvià, the centre Amadip Esment and a parking which we can see in the left side of the *figure 8*. In addition, the consequences of the exploitation of this area are exposed, some of them are:

- Increase in the waterproof surface by buildings and roads
- Drinking water consumption
- Increase road infrastructure load
- Increase energy consumption and the gas emissions derived from it

Figure 8- Territorial planning. Ses Planes triangle currently. (Source: APGOU 2017)

Figure 9- Territorial planning. Ses Planes triangle project. (Source: APGOU 2017)

CONCLUSIONS:

- The goal of the Agenda Local 21 of a 1.348 Ha of developable land reduction was successfully met as we have seen in the maps which compares the situation before and after the *PGOU 2000*. This objective was properly implemented in the *PGOU 2000*. However, we see how the developable land increases from 19 Ha to 76 Ha in the modification of the *PGOU* in 2009 and rise again in the *APGOU 2017* until 87 Ha. The reason of these changes are the actions above described and some other actions the municipality has planned. In general terms, we can conclude that the Agenda 21 goal was achieved, however there has been an evolution of the developable land since the first modification of the *PGOU* which is not in line with the Agenda 21 principles and it should be considered. A monitoring of the proposals should be done in order to ensure their commitment with the environment, that their aim is not purely based on the economic development leaving out the Agenda 21 ideals.
- *MPGOU 2000* aimed to achieve a comprehensive rehabilitation of the coastal space, but very significant changes have not been made. The municipality has performed small constructions every year in the towns which respond to the necessity of maintenance and renovation of the public spaces, however the great expectations put on the *esponjamiento* haven't been met. The *APGOU 2017* recognises that the great buildings of the 60s of the last century are still there and replacement operations have not come. For this reason, we can affirm that the goal of a comprehensive rehabilitation of the coastal space hasn't been achieved.
- The current position of the municipality in the *APGOU 2017* counters with the spirit of the Agenda 21, which objected the urban development in Calvià as a result of the consequences it brought in the 20th Century. The *APGOU 2017* resigns, defending that this development is unstoppable, and the best option is to lead the change. With this argument proposes some actions as the above described. This position can be considered as conformist and it doesn't fit very well with the ambitious objectives the municipality needs related to the energy transition, water consumption, waste generation and transport.
- According to the *Ecobarri* Son Bugadelles, many proposals have been made for years in this area and none of them was implemented because of inconveniencies such as the classification of an erosion risk area or the neighbourhood discontent. The most recent proposal is this residential area which tries to be justified with the argument of considering the environmental impact with the measures above mentioned. However, there is no doubt that this action will create an impact which wouldn't exist if there wasn't any action. A new residential area will not only affect the land, increasing the surface run-off, but the rise in the population will cause a higher energy and water consumption, waste generation and more overloaded roads. Even if the Municipal Council promises a greater energy efficiency, the promotion of non-motorized modes of transport or the integration of water consumption minimization systems, this construction will cause a high impact in Calvià. When local government justifies this action with the green

measures that will accompany it, it is doing *greenwashing,* by hiding that it actually is not beneficial for the environment but playing the role of being environmentally friendly.

- In relation to the Dry marine of Son Bugadelles, the conclusion is similar to the *Ecobarri* Son Bugadelles, since the extension of the industrial estate of Son Bugadelles included one only project some years ago and it finally splitted in these two actions. Both areas are adjacent and have similar conditions. In 2009 the GOB warned about the consequences of the extension of the industrial estate. Once again, the Municipal Council wrap the project with measures that lower the environmental impact. However, there is no way to hide that there will be a greater impact than if there wasn't any project.
- The project of the Natural Park Magaluf marine consists of many actions. In one side, we have the proposal of the new lamination raft where the Aquapark used to be and where the karting currently is. In addition, the Cami de Sa Porrassa will be suppressed, and the wetland recovery and the naturalization of the front sea is planned. This action is very ambitious and would imply a very positive impact in Magaluf. However, it's important to remind that this project is in the advance phase of the APGOU 2017, thus it is still far to be implemented and the project could change.

In the other side, other projects accompany this action, and in this case, they follow a different goal of the preservation of the environment. These are the commercial touristic zone, the protected housing and other smaller projects which plan to be carry on. Here is the demonstration of how the Municipal Council applies a policy of carrot and stick.

- Finally, the project of Ses Planes triangle is slightly different to the previous ones, since it proposes to occupy an area which is not used and create a public space where people could enjoy. This area wouldn't only be composed by public space, but also by private commercial equipment, since the whole zone is not public. The public spaces plan to have a naturalized image and the commercial equipments will be cover with green roofs. However, it is important to pay attention to how the commercial equipments and the teaching equipment will be and if they will be built respecting the landscape. In the same way as they previous projects, this one will be accompanied by measures to lower its environmental impact, but the environmental study of Ses Planes triangle describes the unavoidable consequences it will bring to the territory. To conclude, even if this project will cause an impact in the municipality, it will create an important value to it, will provide the inhabitants with a public space to enjoy and will prevent other less environmentally friendly projects to be performed in the future in this area, so the balance is positive.

TRANSPORT

Calvià struggles to improve the transport in the municipality for very long. The *Agenda Local 21*, *MPGOU 2000* and *APGOU 2017* have tried to deal with it in the last twenty years. ¿Have they found any solution?

PGOU 2000 already in the year 1999 recognises the deficiencies of the transport in Calvià. This statement is proven by the facts. It means, only 17% of the total commutes were made by bus, while 43% by car. According to the

Agenda Local 21 of Calvià, in the year 1995 in the municipality everyday around 70.000 vehicles were driven during the high season and there were around 70 million of commutes every year. 50 million of them corresponded to tourists, it means 2,25 commutes/ person/ day, and the rest to residents with 1,25 commutes/ person/ day and a 95% of their movements by car. In the year 1998, the municipal motorization index exceeded 900 vehicles per thousand inhabitants, while the regional one the same year was less than 800. The same data now a days shows that the trend is the same, in the year 2019 the municipal motorization index was 1.022 vehicles per thousand inhabitants, and the index in the Balearic Islands was 914 (Institut d'Estadística de les Illes Balears, s.f.).

AGENDA LOCAL 21

Goals: Improve public transport and promote pedestrian and bicycle commutes
Initiative: Initiative 29 and initiative 30 of the ERI

The *Agenda Local 21* criticize the lack of innovative proposals by the regional authorities, whose main thought is the multiplication of the road network.
In the initiative 29 of the *Escenario de Rehabilitación Integral* (Prats, F., 1998) (Comprehensive Rehabilitation Scenario or ERI), in order to improve the public transport in the municipality, the following was proposed:

- A report on the insufficiency and low quality of the service at that time.
- The elaboration of an alternative plan for internal communications and with specific destinations such as Palma, airport, university and markets.
- Improvement of the service of the current public transport concession.

The initiative 30 of the same document plan an ecological reconversion of mobility by:

- The development of a local mobility plan based on:
    - Palma-Andratx connection as a fast track to the entire area
    - Passeig Calvià as the articulating axis of the municipality
    - Internal mobility of population centers such as Areas 30 with a reduction in car use
- Request the Balearic Islands Government to prepare an Access and Mobility Plan that avoids the expansion of the number of runways at the airport and improves public transport on the island.

MPGOU 2000

Goal: a more fluid and homogeneous link between the various areas of the municipality
Initiative: incorporation of Passeig Calvià and adaptation of the transversal road axis (C-719 road)

MPGOU 2000 had the objective of a spatial structuring of the municipal territory, by improving its communications network, which guarantees a more fluid and homogeneous link between the various areas of the municipality. In order to meet this goal, there were two **guidelines**. Firstly, the creation of a network of itineraries of environmental and landscape interest in the municipality,

encouraging the quiet use of the road network and non-motorized alternative mobility (pedestrian, cyclist, etc.), incorporating the idea of the *Passeig Calvià* (Calvià promenade); secondly, the adaptation of the transversal road axis (C-719 road) between Palmanova and Peguera.
According to the first guideline, the *Passeig Calvià*, was conceived as a way to join the urban centres of the municipality and a way to promote the alternatives means of transport. In addition, it was considered to add a value the municipality and to provide a new attractive space where both tourists and residents could enjoy.
Regarding the second guideline, the debate about the future of the road C-719 that connects the urban centres with each other and with Palma was opened as a result of its saturation in some parts. With this scenario three cases were proposed:

1. **A new highway of 7,7 Km long:** it has the advantage of solving the saturation problem creating a more fluid traffic having a maximum speed of 120 Km/h, but the are some cons to consider: the great use of rural land; landscape impact; the huge power consumption and CO2 emissions as a result of a higher traffic speed. In conclusion, in the document it's argued that this proposal is clearly against the *MPGOU 2000* objectives for its high impact with the environment.
2. **The partial utilization of the current trace, splitting the road for 8,55 Km:** it suggests a maximum speed of 120 Km/h. In relation with the former case, it has a fewer environmental impact since it's using most of the same trace and the connectivity between the population centers would be even better because of the easy access to them.
3. **Almost entire utilization of the trace, splitting the road as a road park for 7,08 Km:** it implies maintaining almost the full old trace and it would be complementary with the *Passeig Calvià* (Calvià promenade), building pedestrian promenade along 6 Km. Its environmental impact would be minimum, and it would still improve the traffic issue having a maximum speed of 100-120 Km/h. This option is the most beneficial with the environment.

The final decision of the municipality was the second case, however, as a legal requirement, the Government of the Balearic Islands includes its own proposal of an extension of the western highway in the *Plan director sectorial de carreteras of CAIB*. According to the *MPGOU 2000*, the municipality has strongly counter against this proposal several times, but these allegations were totally dismissed.

APGOU 2017

Goals: • Primary objective: promotion of a modal shift towards the use of public transport and non-motorized commutes • Secondary objective: the optimization of public transport adapted to the mobility seasonality
Initiative: Strategy 5, "Calvià towards sustainable mobility"

APGOU 2017 identifies as a primary objective the promotion of a modal shift towards the use of public transport and non-motorized commutes. However, it's

considered as a secondary objective the optimization of public transport adapted to the mobility seasonality. Transport is considered to discharge 19,04% of the total CO2 emissions of the municipality by the year 2017.
Its mayor proposal to meet the above-mentioned objectives is the Strategy 5, "Calvià towards sustainable mobility". In the year 2017, according to the results of a survey of mobility in Mallorca, the prevailing mode of transport in Calvià is still the private vehicle. The document explains that the public transport connexion of Palma with the different urban centres of Calvià is good, but also recognise that the connexion between them is insufficient. In order to address this issue proposes:
• Complete the *Passeig Calvià* (Calvià promenade), extending its route so that it continues through Santa Ponça.
• Expand the pedestrian and bicycle network
• Promote parking areas at the entrances of urban centres and facilitate interconnection with the public transport network
• Propose improvements in the public transport offer to make it more competitive and to improve the connection between centres
• Consider on the one hand the daily mobility of residents in Calvià, and on the other hand, study in detail the mobility of the seasonal population.
• Guarantee accessibility in public transport and in non-motorized modes to the urban centres and areas of economic activity (Son Bugadelles industrial estate).

CONCLUSIONS:

- In first place, the deficiencies in the public transport criticized in the first paragraph and in the initiative 29 and 30 of the ERI are still a challenge in the present, since the *APGOU 2017* identifies as one of its objectives to face this problem, so the situation hasn't really improved. One of the proposals of the initiative 30 of the ERI, which demands a better Palma-Andratx connection has been partially met with the implementation of the bus line to the university. But it is still far to be successful since there are only three lines which arrives at the university at 8am, 3pm and 9pm and it is way slower than using the car, so it's not an alternative solution for the students of the municipality to use rather than their own vehicles. This lack of alternatives contributes highly to the car dependence, shown in the municipal motorization index of the year 1998 and 2019, which are compared and demonstrate that it hasn't gone any better either.
- According to the Agenda 21, the prediction of the regional authorities expanding the road network in order to give solutions to the transport issues of the islands came true with the extension of the western highway, despite the municipal resilience. In this case, the municipality tried hard to object the regional government, bringing on the above-mentioned proposals, so it hardly can be criticized.
- Seventeen years later, the *Passeig Calvià*, is still in progress and is one of the key proposals in the transport agenda of the municipality. It shows the slow performance of the Municipal Council and a lack of innovative initiatives. Even though, part of the objective has been met since it has become a place to hang out and do sport for many people.
- Finally, there is a contradiction in the *APGOU 2017*, when giving priority to the promotion of a modal shift to public transport while letting

as a secondary objective the optimization of the public transport. In one hand a problem with the current public transport is recognised, while in the other hand priority is given to the promotion of it rather than its optimization. The Municipal Council should consider a priority both objectives in order to face this issue which, as demonstrated in this section, has been present in the municipality for very long, contributing to the CO2 emission, traffic jams and the little options of mobility for the population of Calvià.

RESOURCES

In the following section we have the results of **energy, water** and **waste**.

- **ENERGY**

Since the *Agenda Local 21* in 1995 to the climate change and energy transition law of the Government of the Balearic Islands in 2019 many actions have been taken and the situation is not the same at all, but ¿Has it gone any better?

AGENDA 21

Goal: reach the sustainability scenario
Initiative: initiative 32 of the Comprehensive Rehabilitation Scenario or ERI

Our analysis starts in 1995 and our source of information is the Agenda Local 21 of Calvià. According to it, the final energy consumption in the municipality was 31.071 TOE, of which only 70 TOE were renewable energy and produced 257.625 tons/year of CO2 emissions from energy consumption. In 1995 the population in Calvià was 32.587 inhabitants. The *Agenda Local 21* of Calvià include a hypothesis with three possible scenarios in the year 2015: scenario of risk, scenario of stabilization and scenario of sustainability. It's important to take into account that these scenarios considered the following:

• **Risk Scenario:** a continuity of the supply policies, the implantation of renewable energy in a symbolic way and the generation of electric power based on coal.

• **Stabilization Scenario:** Thermal Efficiency and Demand Management Program, the implementation of wind and solar heat energy and the introduction of natural gas in electricity generation.

• **Sustainability Scenario:** advanced programs of Energy Demand Management and Thermal Efficiency, intensified implementation of wind energy, solar thermal and introduction of photovoltaic solar energy and the predominance of natural gas in electricity generation.

They are placed from the worst expected scenario to the best possible one. In the **risk scenario**, the expected final energy consumption is 57.165 TOE, the percentage of renewable energy by the year 2015 is 1% and the CO2 emissions is 477.528 tons/year. In the **stabilization scenario**, it's expected to have a final energy consumption of 52.360 TOE, a 12% of renewable energy and 259.868 tons/ year of CO2 emission. The last and most hopeful scenario, the **sustainability Scenario**, expect to have a final energy consumption of

52.360 TOE, 22% of renewable energy and 204.038 tons/ year of CO2 emissions.
The *table 1* shows the former explanation:

	RISK SCENARIO	STABILIZATION SCENARIO	SUSTAINABILITY SCENARIO
ENERGY CONSUMPTION	57.165 TOE / 664.828.950 Kwh	52.360 TOE / 608.946.800 Kwh	52.360 TOE / 608.946.800 Kwh
RENEWABLE SOURCES (%)	401 TOE / 4.663.630 Kwh (1%)	5.071 TOE / 58.975.730 Kwh (12%)	8.891 TOE / 103.402.330 Kwh (22%)
CO2 EMISSIONS (FROM ENERGY CONSUMPTION)	477.528 tonnes/year	259.868 tonnes / year	204.038 tonnes / year

Table 1- Energy. Future scenarios (Source: Agenda Local 21; Conversion: own elaboration)

The ERI, in its initiative 32 aims to achieve a stabilization-reduction of the energy demand in Calvià by:

- Education, awareness and savings campaigns
- Bioclimatic architecture and materials, use of thermal energy in hot water and photovoltaic panels in outdoor urbanization and efficient air conditioning systems
- Fiscal stimulus measures
- Request to the Balearic Islands Government and GESA to adopt measures throughout the archipelago to promote the savings policy within 10 years.

According to the first explanation where the data of the year 1995 in Calvià were exposed, added to data of the years 2007, 2014, 2015 and 2018 gathered in the database of Ibestat and the data provided by the Calvià Municipal Council in the Calvià Emissions Report 2013-2014, we have the *table 2:*

	1995	2007	2014	2015	2018
ENERGY CONSUMPTION	31.071 TOE/ 361.355.730 Kwh	35.764,4 TOE/ 415.940.091 Kwh	31.925,9 TOE/ 371.298.656,6 Kwh	32.942,23 TOE / 383.129.824 Kwh	35.401,49 TOE / 411.719.374 Kwh
RENEWABLE SOURCES (%)	70 TOE / 814.100 Kwh (0.2%)	-	35.400 Kwh*	43.020 Kwh*	-

CO2 EMISSIONS (FROM ENERGY CONSUMPTION)	257.625 tons / year	384.578,21 tons / year	343.302,73 tons / year	-	-
POPULATION (Nº INHABITANTS)	32.587	47.934	50.363	50.328	49.333

*Table 2- Energy. Data 1995-2018. (Source: Agenda Local 21, Ibestat and Calvià Emissions Report 2013-2014) *Data from the Covenant of Mayors website (Unknown author, s.f.)*

Comparing both tables, we can get some conclusions. It's necessary to consider the rise in the population from 32.587 in 1995 to 50.328 in 2015 to analyse properly this data. In the first place, according to the **energy consumption**, the data of the year 2015 and the most recent one of 2018, prove that the outcome has been better than expected even in the best scenario that is the sustainability scenario. In the year 2015 the energy consumption was 35.401,49 TOE, while the sustainability scenario hoped for 52.360 TOE. Secondly, we had a situation of 2% **renewable energy** in the year 1995 according to the Agenda Local 21 and the actual condition is far from both the stabilization scenario and the sustainability scenario, which expected 12% and 22% of renewable energy respectively by the year 2015. The current situation is worse than the initial one, with a lower percentage of renewable energy to the total consumption, and it's closer to the starting point and the risk scenario than the other scenarios. According to the data provided by the municipality in the Covenant of the Mayors website, the total renewable energy in Calvià was 43.020 Kwh in 2015, which is a 0,01% of the total consumption of the municipality. The Strategy Calvià for the Climate and APGOU 2017 have some proposals to address this issue which will be analysed later.
Finally, we have the **CO2 emissions**, which have suffered an increase from 257.625 tons/year in 1995 to 343.302,73 tons/year in 2014. Again, the best possible scenario was not reached, and in this case, it is somewhere in between the risk and the stabilization scenario.

COVENANT OF MAYORS

Goal: 20% of CO2 emission reduction of the year 2007 by the year 2020
Initiatives: Strategy Calvià for the Climate 2013- 2020 and Action Plan for the Sustainable Energy 2013- 2020

The analysis continues with the next important attempt to reduce the CO2 emission by paying attention to the energy consumption and renewable energy among others. This is the union of Calvià to the Covenant of Mayors in the year 2011, which implies a commitment to implement the European Union climate and energy objectives on its territory. The Covenant of Mayors, responsible of the Sustainable Energy Action Plan 2010-2020 (SEAP from now on), helps the

local authorities to make real the greenhouse gas (GHG) emissions reduction. The *figure 10* shows how it works:

Figure 10- The Covenant of Mayors for Climate and Energy step-by-step process. (Source: The Covenant of Mayors for Climate and Energy Reporting Guidelines)

The action plan of Calvià municipality has been the Report of emissions in Calvià from 2007 to 2013, the *Plan de Acción para la Energía Sostenible de Calvià 2013-2020* (Action Plan for the Sustainable Energy 2013- 2020, PAES from now on) and finally the *Estrategia Calvià por el clima* 2013-2020 (Strategy Calvià for the Climate 2013- 2020).
The target of the SEAP was to reach a 20% of CO2 emission reduction of the year 2007 by the year 2020. The strategy to follow was to finish with the heating oil dependence, to develop new efficiency and renewable energy technologies, the implementation of natural gas and to focus on the action on the tourist sector, which is the sector with the higher CO2 emission.
The *table 3* shows:

	2007	**2013**	**2014**	**DIF. 2013-2014**	**DIF. 2007-2014**
ENERGY CONSUMPTION	384.578,21 (59,42% of the total)	349.185,08	343.302,73 (66,14% of the total)	-1,713 %	-10,7%

NATURAL GAS*	6.715,93 (1.03% of the total)	7.561,37*	7.643,53* (1,43% of the total)	1,09%	13,81 %
LIQUIFIED PETROLEUM GAS*	16.301,75 (2,51 % of the total)	10.730,45 *	10.798,48 * (2,08% of the total)	0,63%	-33,75 %
DIESEL*	113.151,10 (17,48% of the total)	28.838,13 *	19.576,05 * (3,77% of the total)	-32,12 %	-82,69 %
ROAD TRANSPORT	126.376,43(19,52 % of the total)	136.513,65	137.692,78 (26,52% of the total)	0,85%	8,95%
WASTE MANAGEMENT	16.533,73 (2,55% of the total)	15.200,36 *	13.660* (2,63% of the total)	-0,83%	-11,99 %
TONNES CO2	**647.140,40**	**532.843,96**	**519.028,73**	**-2,59%**	**-19,8%**

*Table 3- Inventory of CO2 emissions. (Source: Report of emissions in Calvià 2007-2014 in tonnes) *Data not updated, correspond to years 2011 and 2012*

In the same way that we found some discrepancies between the data of renewable energy provided by the Municipal Council in the Covenant of Mayors website and the *Agenda Local 21*, here we have the same situation. In one hand the Report of emissions in Calvià from 2007 to 2014 defends 647.140,40 tons of CO2 emission in the year 2007 and 519.028,73 tons in 2014, and in the other hand, the data provided by the Municipal Council in the website of the Covenant of Mayors show 509.724,88 tons of CO2 emissions in the year 2007 and 420.374,39 tons in 2015. Despite this inconvenience, according the former table, the Report of emissions in Calvià from 2007 to 2014 clarify the outcome of the project, which is the following one:

- There has been an important decrease of diesel and liquified petroleum gas equivalent to 82,69% and 33,75% respectively.
- The power consumption has suffered a decrease of 10,7 % of CO2 emission from the year 2007 to 2014.
- There has been a decrease of 12% from 2007 to 2014 in the waste management.
- One negative aspect is the 8.95% increase of CO2 emissions in the road transport.
- Natural gas has also suffered an increase 13,81% from 2007 to 2012.

The overall outcome is a reduction of 19,80% of CO2 emission from 2007 to 2014 in Calvià. This has been reached mainly because of the improvement in the energy efficiency based on the implementation of the natural gas in the island which has caused a great decrease of the diesel dependence for residential purposes.

Which means did the municipality used to achieve this target?

Some of the most significant actions are explained in the *Estrategia Calvià por el clima 2013-2020* (**Strategy Calvià for the Climate**) and they are included in the energy efficiency plan that it includes. In 2012, year when it was written, the main proposal was the investment in the private sector on natural gas. The reason to do so was that the greater source of energy in the tourist sector was the diesel and the liquified petroleum gas, both highly pollutant have been settled in the municipality as a result of the lack of infrastructure and a better alternative. The plan was then promoting the investment of the tourist sector in the adaptation of their infrastructures to the natural gas whose emissions are 30% less polluting than the diesel.

Another achievement was the saving of 22% of the energy for the public lighting in the years 2005-2010 by changing the former mercury vapor bulbs for high pressure sodium bulbs or LED, which contributed to a reduction of 2.000 tons of CO2/ year to the atmosphere. In order to keep the trend, the objective proposed between 2013-2016 is a reduction of 28% of power consumption regarding 2007.

The proposal related with renewable energy was to cover the 5.000 m2 of municipal roof with photovoltaic panels in the middle term. This was planned to contribute with around 700.000 Kwh of renewable energy per year. Additionally, the target of the project number 29 of the PAES is to reach the 5% of the houses of the municipality with photovoltaic panels. Also, with the project number 30, the goal is that the 50% of the hotels of Calvià meet the 20% of their power consumption with photovoltaic panels before 2020. Finally, in the 31st project, the target is that at least 50% of the companies of the Son Bugadelles industrial estate meet the 10% of their power consumption with photovoltaic panels. But there is not specific action to reach the last three objectives other than promotion.

According to the construction plan, the environmental requirements established in the PGOU Calvià are high and includes the recommendations of the Spanish Net of Cities for the Climate and the Technical Code of Edification (CTE). For this reason, in this document the proposal was giving to know these requirements to professionals affected by them, in order to achieve their performance. In addition, it is said that there will be incentives to those projects that include environmental criteria, energy efficiency and thermal insulation. The proper implementation of the above-mentioned measures would imply a save in the energy consumption in the new buildings between 24% and 39%.

The Strategy Calvià for the Climate identifies the road transport as the second most pollutant sector in the municipality with a 19,04% of the total CO2 emission right after the power consumption. The main reason of it, is the high dependence on the private vehicle to commute both inside the municipality and to Palma. The cause of this problem is the lack of an optimized public transport and the distance between the different urban areas of Calvià. In order to address this issue, not very significant measures were taken. The only action related to the public transport was its promotion through awareness campaigns.

According to the electric vehicles, the office *Calvia por el Clima*, gave the service of consulting for the acquisition of any of these vehicles and the main proposal was the deployment of electric car recharge points from 2012 to 2016. Finally, it was proposed a reduction of the speed limit in certain areas to 30 km/h to achieve a reduction of CO2 emissions. However, the project number 57 of the PAES include a tax rebate in the Mechanical Traction Vehicle Tax of 75% for electric vehicles and 50% for hybrid ones.
Even if the waste management does not represent a big percentage of the total CO2 emissions, in the Strategy Calvià for the Climate an improvement in the agreement of the separate collection of the municipality with the tourist sector is proposed. It implies an increase on the tourist seats from the former 66% of the tourist seats (95 hotels) to a 75% (115 hotels) in this agreement.

APGOU 2017

Goals: CO2 emissions reduction of 40% by 2030.
Initiative: deployment of photovoltaic panels in the industrial estate of Son Bugadelles

Finally, we have the Review of the *PGOU* in the year, which will drive to the *APGOU 2017* in the year after, that address the power consumption in line with the above explained documents. It proposes the extend the deal with the Covenant of the Mayors to the year 2030 rising the goal of 20% of CO2 emissions reduction by 2020 to 40% by 2030.
Most of the responsibility to achieve this goal is delegated to the Strategy Calvià for the Climate, however this Review proposes the deployment of photovoltaic panels in Son Bugadelles. This industrial estate is 25 Ha big and in the *figure 11* we can see its high aptitude to the deployment of these installations.

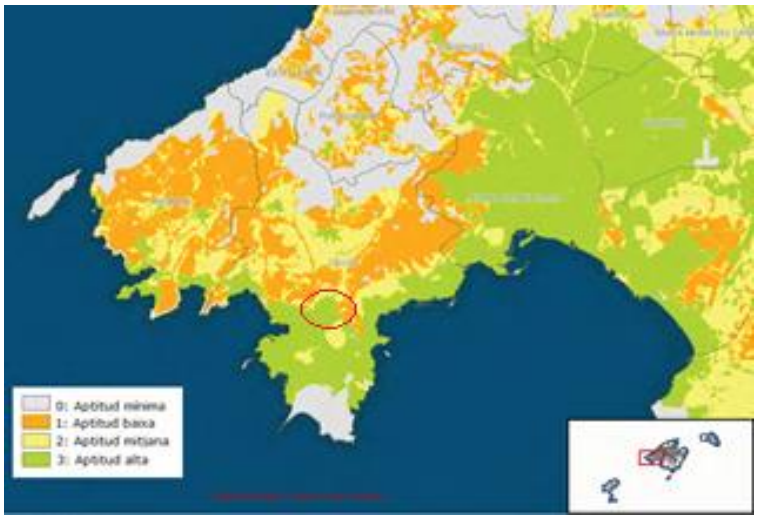


Figure 11- Geographical information of the aptitude for photovoltaic installations (Source: IDEIB,s.f.)

CAIB

Goals: • Greenhouse gas emission reduction: 40% and 90% by 2030 and 2050 respectively.

• Primary energy consumption reduction: 26% and 40% by 2030 and 2050 respectively. • Renewable energy consumption: 35% and 100% by 2030 and 2050 respectively • Energy efficiency: 32.5% by 2030
Initiative: energy management plans and implementation of renewable energy

The Government of the Balearic Islands passed the *Ley de cambio climático y transición energética* (Unknown author, 2019) (climate change and energy transition law), which demands the support of the municipal councils of the region to achieve its objectives, which are:

- Greenhouse gas emission reduction: 40% and 90% by 2030 and 2050 respectively.
- Primary energy consumption reduction: 26% and 40% by 2030 and 2050 respectively.
- Renewable energy consumption: 35% and 100% by 2030 and 2050 respectively
- Energy efficiency: 32.5% by 2030

In order to achieve these goals, the article 22 asks the municipalities to adopt action plans for climate and sustainable energy in accordance with the methodology adopted in the field of the European Union. Similar proposals will be explained later in the section Urban Agenda for the EU.
The law also includes some specific measures:

- Buildings with installations with a nominal installed thermal power greater than 70 kW or a contracted electrical power greater than 100 kW must have energy management plans.
- Renewable energy consumption must be progressively implemented in all buildings and facilities, regardless of ownership.
- New parking plots located in urban soil bigger than 1000 m2 must be covered by photovoltaic panels

CONCLUSIONS:

- According to the first analysis, where the scenarios expected in the *Agenda 21* were compared with the actual data, we can summarize that: the energy consumption outcome has been positive based on the expectations, but it's not an actual achievement since it has increased; the renewable energy performance has been very disappointing due to its poor influence in the municipality; and the CO2 emissions have increased, but again not that much as expected.
- In relation to the Covenant of Mayors deal, in first place, recognize not only the achievement of resorting to an international group of experts to meet the municipality goals, but also to be able to accomplish them. Secondly, there are two aspects to criticize in this agreement. The first critique goes to the goal of 20% of CO2 emission reduction by 2020. In the Strategy Calvià for the Climate, it was expected a reduction of 15,7% of the total CO2 emission of the municipality with the only implementation of the natural gas in 2013. It means that the goal was almost met with this only measure seven years before the deadline. This easy reduction gave the municipality the possibility to overlook important issues such as

the road transport, which increased its CO2 emission 8,95%between 2007 and 2014. These arguments demonstrate how low this goal was and how the Municipal Council with a higher commitment could have reached a better outcome. The second critique is toward the star measure of the municipality to achieve its goal, the implementation of natural gas. Its main argument was the fast CO2 emission reduction because of the substitution a diesel and liquified petroleum gas by it, which produces 30% less CO2 emission. This investment was useful to achieve the goal of the Covenant of Mayors; however, it is a short-term measure because it has caused a great investment in natural gas installations which still pollutes. Looking at the objective of a 90% decrease of CO2 emissions by 2050 of the climate change and energy transition law of the Government of the Balearic Islands, it seems a great mistake the promotion of natural gas rather than renewable energy since now it will be harder to deal with the installations already deployed in the future. Then, some other measures have been proposed such as covering municipal and houses roofs with photovoltaic panels and the commitment of some hotels and companies in Son Bugadelles, but even if this was achieved, the percentage of renewable energy in Calvià would still be very low. More significant actions must be taken. Here we have again the problem of the transport in the municipality without a clear solution for it.

- Finally, as previously mentioned, there are some discrepancies in the data provided by the municipality with other sources of information. In the first case between renewable energy data of the *Agenda Local 21* and the one provided by the Covenant of Mayors website and secondly, between the CO2 emission data, in this case, between the Report of emissions in Calvià from 2007 to 2014 and the Covenant of Mayors website again. In order to promote transparency and an involvement of the population in the issues of the municipality, the information should be reliable and as understandable as possible. For this reason, the municipality should pay attention to the democratization of its information.

- **WATER**

Calvià started the 21st Century with no clear water cycle planning on its record. Twenty years later, ¿Has is taken the control of the water of its territory?

AGENDA 21

Goals: Reduction of water consumption, urban water recycling of 11% of the total demand by the year 2007 and deployment of tertiary systems in treatment plants
Initiative: initiative 31 of the Comprehensive Rehabilitation Scenario or ERI

Agenda Local 21 remarks that in the year 1995 around 10 Hm3 of water were consumed. It also exposes that there were losses in the water network of 16% and the use of own resources were equivalent to a 30% of the total consumption with a slightly overexploitation of them. By that time, all waste was cleaned up with secondary treatment and 58% of them were reused mainly to water golf courses. It is strongly criticized in the document the lack of planning

oriented to saving and sustainable management of water. The goals proposed are the following:

- Reduction of water consumption from 130 and 160 litres/ day per resident and tourist respectively in the year 1997 to 117 and 134 litres/ day per resident and tourist respectively in the year 2007.
- Urban water recycling of 11% of the total demand by the year 2007.
- Deployment of tertiary systems in treatment plants to serve public spaces, green areas and the tourist industry in: Bendinat, Paguera, Santa Ponça, Calvià and Es Capdellà in less than three years.

The *Escenario de Rehabilitación Integral* (Comprehensive Rehabilitation Scenario or ERI), in its initiative 31 pretends a stabilization-reduction of the water demand in Calvià. In order to achieve this, demands a strategic planning in the year 1998 that stabilise the inflow of drinking water of 1997. It also proposes some measures, some of which are the following ones:

- Fiscal stimulus
- Hydraulic efficiency
- Education and awareness campaigns
- Introduction in the PGOU of regulations for new buildings

MPGOU 2000

Goal: rational use of water and the responsible management of natural resources and the environmental protection
Initiative: installation of individual water meters for each individual consumption point, use of rainwater through the construction of cisterns, use of reclaimed water from treatment plants and use of grey water in single-family houses

According to the MPGOU 2000, the water supply in the municipality is perfectly guaranteed in terms of quantity and quality thank to resources, such as groundwater, and foreign resources, mainly from the Emaya network in Palma. The exception is Paguera, that has certain deficiencies in the water quality. This issue was planned to be solved with the building of a new pipeline in order to bring water from the desalination plant of Palma. In the MPGOU 2000, it is recognised that this increase in the water supply of the municipality shouldn't imply a rise in the water consumption, but it is seen as a strategy in case of an eventual deviation of the consumption. It is also said that this way of producing water, from the environmental point of view, is an irresponsibility since it implies a 5 Kwh/m3 of power consumption which comes from fossil fuels. In line with the Agenda Local 21, the MPGOU 2000, recognises the need of a decrease in the water consumption. For this reason, one of its objectives is the rational use of resources (water, energy, waste, etc.), promoting savings and recycling; and the responsible management of natural resources and the environmental protection. In order to meet this goal some compulsory measures are explained:

- Installation of individual water meters for each individual consumption point
- Use of rainwater through the construction of cisterns.
- Use of reclaimed water from treatment plants
- Use of grey water in single-family houses

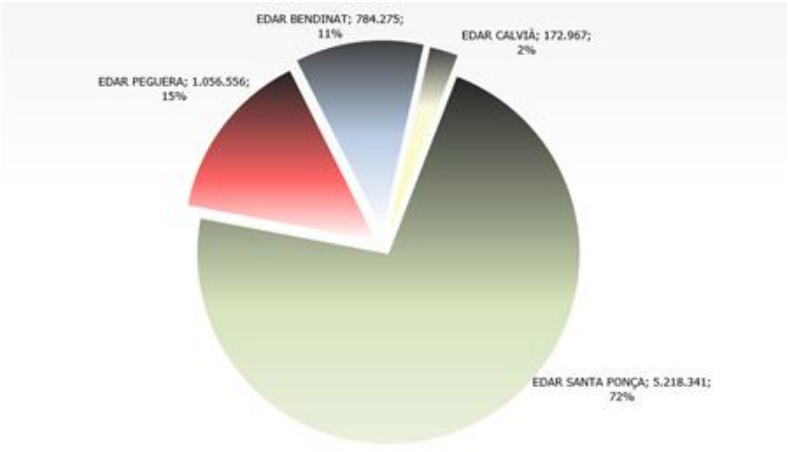
CALVIÀ 2000 S.A

Goal: Improvement of the purified water quality, use of reclaimed water, replacement of conflicting sections and elimination of black spots in the networks and improvement of the performance of the drinking water network
Initiative: deployment of a tertiary system in the new treatment plant of Calvià-Es Capdellà and Santa Ponsa

Calvià 2000 S.A is a public company of Calvià municipality responsible of the municipal services according to the area of environmental management and the area of the water cycle since 1987. The first document made by the company in order to give visibility to its action dates the year 2006 (Delgado, 2006). Its actions follow to meet these objectives:

- Improvement of the purified water quality
- Use of reclaimed water
- Replacement of conflicting sections and elimination of black spots in the networks
- Improvement of the performance of the drinking water network

Calvià 2000 S.A proposes in 2006 the deployment of a tertiary system in Santa Ponsa in line with the *Agenda 21* goals.
In 2010 there was a significant change in the functions assigned to Calvià 2000 S.A within the scope of municipal service management in which the Municipal Council gave the responsibility of the management of the municipal drinking water supply service through indirect management and under concession to the public company (Hernández, 2010). However, Calvià 2000 S.A does not recognize any significant measure beyond the annual actions to meet goals such as reduce losses in the water network. Actually, the objectives year after year keep untouched.
Until 2012 there were five treatment plants in Calvià, but then the one of Capdellà was removed (Onieva, 2012).
In the *graph 1*, we have the volume of water purified in Calvià according to the different treatment plants:



Graph 1- Purified water volumen in Calvià 2018 (m3/year)(Source: Memoria de gestión Calvià 2000, 2018)

In the annual document of 2018 (Serra, 2018), the public company, in order to extend the tertiary systems of the treatment plants of the municipality, whose only one is in Bendinat, proposes two projects. The first one is the deployment of a tertiary system in the new treatment plant of Calvià-Es Capdellà. And the second and most important one, is the incorporation of a tertiary system to the treatment plant of Santa Ponça which will imply a rise of the regeneration of water from 12% to an 85%.

PGOU 2017

Goal: • Relevant objective: implementation of an efficient and comprehensive management of the water cycle • Secondary objective: guarantee the quality of marine waters and ground and surface waters • Deployment of tertiary system for all the treatment plants of the municipality
Initiative: development of actions to improve surface runoff and commitment to SUDS (Sustainable drainage systems) measures in urban design, the expansion of the Son Bugadelles treatment plant and the construction of the tertiary system of the Santa Ponça treatment plant

The *APGOU* 2017 set certain objectives rated from most to least important in the following order: primary, relevant and secondary. Some of which address the issue of water consumption. One of the objectives named as relevant is the development of measures for the implementation of an efficient and comprehensive management of the water cycle, due to the high dependence on its importation. It also set some secondary objectives which are to guarantee the quality of marine waters by implementing tertiary wastewater treatment systems, since Calvià has a 54 Km coastline and guarantee the quality of ground and surface waters, as a result of the vulnerability of the masses of groundwater and the extensive network of torrents. Finally, proposes a concrete goal, the deployment of tertiary system for all the treatment plants of the municipality in order to use this water to irrigate the *Passeig Calvià*, green public areas, golf links and marinas.
The annual volume of water distributed in the municipality is 10,96 Hm3 and the annual volume of water purified according to the different treatment plants is:

- Santa ponsa: 5,8 Hm3/year
- Peguera: 1,28 Hm3/year
- Bendinat: 0,8 Hm3/year
- Calvià-Es Capdellà: Hm3/year

Finally, the measures proposed to meet the former objectives are the development of actions to improve surface runoff and commitment to SUDS (Sustainable drainage systems) measures in urban design; the expansion of the Son Bugadelles treatment plant and the construction of the tertiary system of the Santa Ponça treatment plant.

CONCLUSIONS:

- In the last annual document of Calvià 2000 SA of 2018, it is still recognised as a challenge to meet the above-mentioned *Agenda Local*

21 goals. According to the data provided in the *APGOU 2017* we see an increase in the water consumption in the municipality from 10 to 10,96 Hm3/year. If we consider the 32.587 inhabitants of the year 1995 with the annual consumption of 10Hm3 and we compare it with the data of 2016, 49.580 inhabitants and 10,96 Hm3 annual water consumption, we get 840,74 L/person/day in the first case and 605 L/person/day in the second case. Even if we are not considering the number of tourists, we can clearly conclude that there has been a decrease in the water consumption per person in Calvià.

- According to the other objectives, firstly, the urban recycling water of 11% by 2007 has been met, but the outcome expected by 2007 is mostly the one of 2018, a 12%. So, here we see how the objective of the Agenda 21 has been stalled and lacks renovation. Secondly, the goal of the deployment of tertiary systems in treatment plants is far to be achieved since the only one implemented is in Bendinat. It means only one out of four treatment plants have it. Nevertheless, Calvià 2000 SA plans to implement them in Santa Ponsa and Calvià-Es Capdellà. The *APGOU 2017* picks up the former goal with two proposals on the table, however, not enough to meet the goal since doesn't consider the treatment plant of Paguera.

- **WASTE**

Calvià proposed high objectives in the *Agenda Local 21* twenty years ago as well as Calvià 2000 S.A has done more recently, ¿Were these goals met? ¿Will the new ones be accomplished?

AGENDA 21

Goal: reach the Sustainability Scenario and 20, 30 and 70% separate collection by 2000, 2001 and 2007 respectively
Initiative: initiative 33 of the Comprehensive Rehabilitation Scenario or ERI

According to data provided by *Agenda Local 21* of Calvià, in 1995, the municipality generated around 41,000 Mt of urban waste and 190,000 Mt of rubble and inert waste. This is equivalent to 1.25 kg per resident per day and 1 Kg per tourist per day. Only 2% of the total waste previously commented is separate collection. In this same section, efforts to constantly improve cleaning services are criticized, without paying special attention to the separate collection, treatment and recycling of urban waste and rubble. This causes the municipal landfills to fill up, the compost to be lost, and the implementation of non-environmentally friendly systems such as the Palma incinerator to be forced. The *Agenda 21* set three goals for the separate collection in the short, medium and long term:

- 20% by 2000
- 30% by 2001
- 70% by 2007

In the same way as with the energy, the *Agenda Local 21*, in its section 5, creates three possible scenarios by 2015: scenario of risk, scenario of stabilization and scenario of sustainability. These are the programmes that will guide each of them to achieve their goals, which appears in the *table 4*:

• **Risk Scenario:** Separate Collection of Conventional Contribution.
• **Stabilization Scenario:** a Waste Reduction Campaign, an Intensified Contribution Collection and a Partial Origin Separation in Hotels.
• **Sustainability Scenario**: a Waste Reduction Campaign, a Separate Collection of Maximized Contribution and a Generalized Separation at Origin.
The risk scenario is the worst expected one, and it predicts a percentage of separate collection of 13,8% by the year 2015 and 81.754 tonnes of waste generation. The stabilization scenario is somewhere in the middle and forecasts a separate collection of 28% and a waste generation of 76.348 tones. Finally, the best possible scenario by the year 2015, the sustainability one, expects a separate collection of 75% and 76.348 tons of waste management.

2015	RISK SCENARIO	STABILIZATION SCENARIO	SUSTAINABILITY SCENARIO
WASTE GENERATION	81.754 tonnes	76.348 tonnes	76.348 tonnes
SEPARATE COLLECTION (%)	11.274 tonnes (13,8%)	16.140 tonnes (28%)	38.856 tonnes (75%)

Table 4- Waste. Future scenarios (Source: Agenda Local 21)

The data provided in the former explanation where the actual data of the year 1995 in Calvià was exposed, is complemented with the data of the years 2015 and 2018 gathered in the database of Calvià 2000 S.A, and are shown in the *table 5*:

	SITUATION 1995	SITUATION 2015	SITUATION 2018
WASTE GENERATION	41.339 tonnes	54.787 tonnes	58.717 tonnes
SEPARATE COLLECTION (%)	804 tonnes (1.9%)	12.191 tonnes (22.25%)	14.313 tonnes (24.38%)

Table 5- Waste. Data 1995-2018. (Source: Agenda Local 21 and Calvià 2000 S.A)

If we compare both tables, we can find some conclusions. Firstly, according to the **waste generation**, the data of the years 2015 and 2018 prove that the best scenario has not only be achieved, but it has been a success. There has been a rise from 41.339 tonnes to 58.717 tonnes while the *Agenda Local 21* expected 76.348 tonnes in the best case. Secondly, we have a different outcome. In this case, the **separate collection** didn't even meet the stabilization scenario. There has been an increase of the percentage of separate collection, from 1,9 % to 24,38 %, but a higher improvement was expected. We can say that it was close to reach the stabilization scenario, 28 %, but very far from the sustainability scenario, 75%. In conclusion, one out two objectives were fulfilled.

Finally, in initiative 33 of the *Escenario de Rehabilitación Integral* (Comprehensive Rehabilitation Scenario or ERI), the aim was to improve the situation as follows:

- Basic information and citizen collaboration
- Waste separation
- Marketing of recovered materials and use of compost in local programs.
- Fiscal and tariff stimulus.
- Request to the Island Council to adopt measures to extend to the entire archipelago the policy of minimizing urban waste, its recovery, composting and recycling

MPGOU 2000

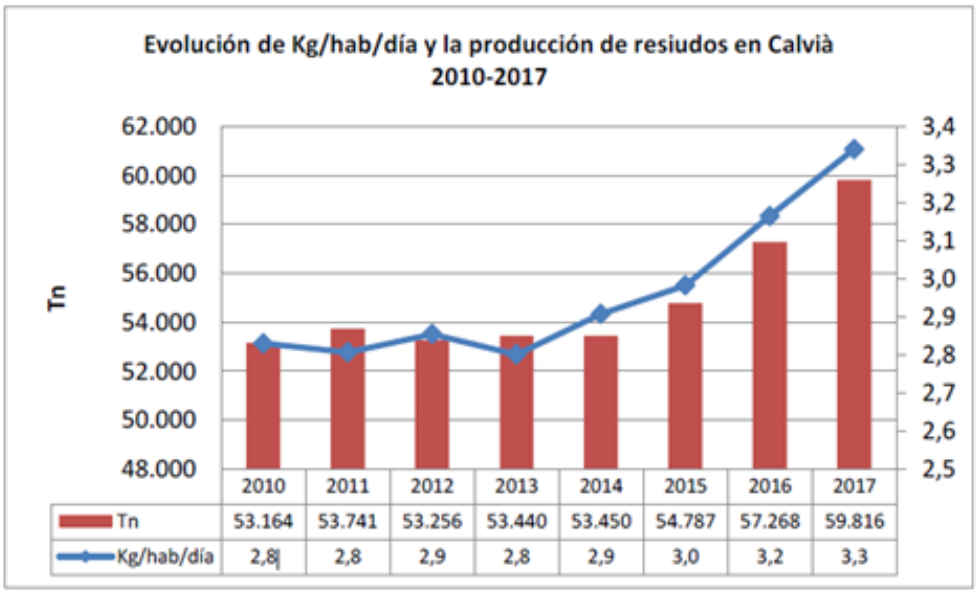
Goal: rational use of waste and the responsible management of natural resources and the environmental protection
Initiative: reduction of solid residues and the provision of a composting plant for the municipality

One of the objectives of PGOU 2000 is the rational use of resources (water, energy, waste, etc.), promoting savings and recycling; and the responsible management of natural resources and the protection of the environment. Later, in point 18.1.6, it is proposed, according to the solid residues, its reduction by promoting recycling and the provision of a composting plant for the municipality.

CALVIÀ 2000

Goal: 10% waste reduction or 2,5 kg/person/day regarding 2010
Initiative: *Plan de Prevención y gestión de residuos*

Calvià 2000 S.A in 2018 launched its star project in order to achieve the zero waste, this is the *Plan de Prevención y gestión de residuos* (waste prevention and management plan). In this document, priority is given to the prevention instead of reuse and recycling. The objective is to reach a 10% waste reduction regarding 2010.
It considers the *Ley de residuos y suelos contaminados* (Unknown author, 2011) (law of waste and contaminated soils of the Balearic Islands), which establishes that public administrations must plan prevention measures that will lead them reduce the weight of the residues produced in 2020 in a 10% respect to the generated in 2010 and according to reuse and recycling establishes a 50% of recyclable fractions from household waste before 2020. However, in the year 2010 the municipality generated 50.992 tonnes and in 2018, reached 58.717, which means it increased rather than decreased. In the long term, the *Ley de residuos y suelos contaminados de las Illes Balears* is taken into account. It defends reducing the waste generation 20% by 2030 regarding 2010 and increase up to 50% of the weight for reuse and recycling by 2020 and 65% by 2030.
The graph 2 shows the evolution of the waste production per person per day in Calvià, considering not only the local people, but also the tourists which are great contributors to this issue.



Graph 2- Evolution Kg/pax/day and waste generation in Calvià 2010-2017 (Source: Memoria de gestión Calvià 2000, 2018)

The goal above presented of 10% waste reduction by 2020 is equivalent to a consumption of 2,5 kg/person/day.
The Plan includes some initiatives which intend to drive the municipality to meet this objective. These are:

- **Encourage self-composting**: 2% of citizens and 50% of schools participation is expected which would imply a 248.693 kg reduction.
- **Reduce food waste:** 5% of citizens participation and 50% of hotels participation is expected which would imply a 98.539 kg reduction.
- **Reduce the use of single-use containers and packaging:** 2% reduction of production per person per year would imply 52.339 kg reduction. Actions: disposal of single-use plastic bags, reduction of uses of containers and packaging for public awareness, use of reusable containers and packaging (in schools, hotels, etc.) and reduction of water containers.
- **Reduce the use of paper and paperboard:** 9 kg reduction of production per person per year would imply 120.209 kg reduction. Actions:
- **Reduce glass containers:** 2.061 kg are expected to be reduced.
- **Other reductions:** reuse of clothing and footwear, prevention of construction and demolition waste and use of reusable diapers contribute with 97.120 kg reduction.
- **Promote waste prevention at parties and celebrations:** 527 events per year where 300kg waste per event is produced. This would reduce 79.050kg the waste production by promoting reusable dishes for example.

PGOU 2017

Goal: reach zero waste in the municipality
Initiative: delegates to *Calvià 2000*

APGOU 2017 in the Strategy 2 defends that the municipality waste management must aims to reach zero waste and promote recycling and waste reuse.
In Calvià the following waste facilities are present according to the *APGOU 2017*:

- In 2002 started to work in Son Bugadelles industrial estate the *deixalleria* or Green Park which basically is a place where people can drop the urban wastes which cannot be thrown into the containers on public road. This place gathers every year more than 2.000 tons of rubble, wood, metals, flat glass and pruning remains.
- There is a 5,700 m2 composting plant belonging to TIRME that collects the organic and the municipal vegetable fraction. The residents of Costa de la Calma complained for years of the bad smells the composting plant releases (Aguiló, Los vecinos de la Costa de la Calma, hartos de promesas y malos olores, 2020). This is caused by the treatment of sludge resulting from sewage treatment. As a response to this issue the Consell of Mallorca decided that most of the sludge responsible of the smells will be treated in the composting plant of Palma.
- Transfer station for separate collection waste and urban waste
- Transfer and pre-treatment centres for bulky waste and out-of-use tires

CONCLUSIONS:

- The *Agenda Local 21* proposed two goals. The first one, the waste generation in 2015 was successfully met and the second one according to the separate collection was a failure. However, there are more things to conclude in here. It is not fair to consider this outcome as a one out of two or 50% of the goals were achieved, since there are more things to analyse. Firstly, the separate collection outcome was really far to the goal and still today is not even close to be achieved. Secondly, what was considered an achievement according to the Agenda 21 it is not for the *Plan de Prevención y gestión de residuos.* The situation in 1995 was a waste consumption of 1,25 kg/resident/day and 1 kg/ tourist/day, which is the same as 2,25 kg/person/day. The graph 2 shows a waste production 3,3 kg/person/day in Calvià in 2017 and the goal of the *Plan* is to have a production of 2,5 kg/person/day. Then, the conclusions seem to be different, what was an achievement for the *Agenda 21* is now a failure for the *Plan* since the situation is worse than 1995.
- Calvià has a composting plant has predicted *MPGOU 2000*, however it appeared as a solution to manage the waste of Calvià in a responsible way, but it triggered some troubles as we have seen in the *APGOU 2017* section.
- The *Plan de Prevención y gestión de residuos* of Calvià analyses the current situation of the municipality, set concrete goals easy to track and specific initiatives to meet them. For first time Calvià puts all its efforts into the prevention instead of reuse and recycling which is good. It also considers the *Ley 22/2011, de 28 de julio, de residuos y suelos contaminados* and the *Ley de residuos y suelos contaminados de las Illes Balears.* It seems a lot of effort and good intentions are put in this topic, however it's important to consider that most of the measures

depend on people will and their involvement, which is unpredictable, and it could lead the *Plan* to the failure. Nevertheless, the good job of Calvià 2000 in the waste management of Calvià must be highlighted.

COMPARATIVE STUDY

- ### URBAN AGENDA FOR THE EU

As it is described on its own website, the Urban Agenda for the EU was launched in May 2016 with the Pact of Amsterdam and it aims to promote cooperation between Member States, cities, the European Commission and other stakeholders in order to address issues such as the climate change, the energy transition, the circular economy or the urban mobility in the cities of Europe. The objectives stated in the Pact of Amsterdam are the following ones:

- Maximizing the potential of EU urban areas towards the objectives of the EU.
- To establish a more effective integrated and coordinated EU policies and legislation with a potential impact on urban areas.
- Both the involvement of urban authorities in the design of urban policies and to encourage them for their implementation.

The Urban Agenda for the EU focuses on three pillars which will divide its action plans into a **better regulation, better funding** and **better knowledge**. It addresses a great variety of issues, but we will analyse the action plans of four of them in order to find some possible implementation to Calvià municipality. They are: **The Climate Adaptation Partnership, the Circular Economy, the Energy Transition, and the Partnership for Urban Mobility**

CLIMATE ADAPTATION PARTNERSHIP

The main focus of the Climate Adaptation Programme, according to the Working Programme of the Urban Agenda for the EU, is to anticipate the adverse effects of climate change and take appropriate action to prevent or minimise the damage it can cause to Urban Areas. In order to achieve this goal, it proposes concrete actions and the monitoring of its Action Plan.
Two actions out of the ten described in the document are the ones that are most suitable for the case of Calvià municipality. In the scope of a better funding we have **“A new LIFE for urban adaptation projects”,** which will be explained in detail, and regarding a better knowledge we have **“Improving EU municipalities knowledge in the framework of Copernicus Climate Change Service”**
“A new LIFE for urban adaptation projects” is described as an action which aims to improve the access of municipalities and cities to LIFE funding for urban adaptation projects. Four specific problems that prevent local authorities to access LIFE funding for their climate adaptation projects are detected:

- Insufficient co-financing: the 55% (since 2018) co-financing by LIFE is a barrier for cities since the remaining 45% is a challenge.
- Complexity: many of the LIFE calls are complex, having timetables and conditions adapted to the different calls.
- Information gaps: local authorities do not always know about LIFE funding.

- Limited support from regional or national authorities: the lack of awareness of these authorities of the LIFE projects submitted by cities and their outcomes can be a barrier.

The technical assistance of LIFE works towards projects which implement environmental or climate action plans on the regional, multiregional or national level to cover several cities; projects in areas of nature, waste, air and climate change mitigation and adaptation; the preparation of a future project proposal that targets an eligible action plan, hence linked with the project funding.

ENERGY TRANSITION PARTNERSHIP

According to its action plan, the Energy Transition Partnership aims to initiate and support a structural change in the way energy systems operate by creating a smarter and more integrated energy system, from a European down to a local level. It focuses on:

- Improving the energy efficiency at a city-level.
- Fostering innovative approaches to energy storage and supply.
- Foster the renewable energy at a local level.

The action plan includes five actions that face different objectives which are the energy efficiency, EU funding for cities, district energy and energy master planning. Two of them fit the best with the topic analysed in the thesis. The first one is the action 2, **"maximising use of waste heat in cities",** which focuses in two pillars, a better regulation and a better knowledge. The second one, which is the action 4, **"deployment desks' for city retrofitting"** aims a better regulation and is the one which will be explained.

In the document, the action 4 recognizes the need of retrofitting in most houses to increase their energy efficiency, arguing that in the European Union almost 50% of energy consumption is used in heating and cooling and 80% of it is used in buildings, which contributes with a 36% of CO2 emissions. It is said that around 250 million homes in the EU will need to be retrofitted in order to achieve the energy transition before 2050 and meet the Paris Agreement goals. The retrofitting of buildings consists on an improvement of the insulation of the building envelope, renovated heating and cooling installations with smart meters and controls and management systems consistent with energy transition objectives among other measures.

The solution proposed is the creation and operation of the called "Deployment Desks", which would work mainly as project development units and providing advice for the municipalities and property owners also. They are public offices, at the local or regional level, whose job is to achieve the regeneration and energy retrofitting. Some of the tasks they could perform are to provide advice on technical solutions, management of public subsidies or help obtaining favourable bank loans to property owners. In order to perform properly their job, they should have to be based in and led by public bodies. It should be considered also the importance of hiring professionals with multiple skills, it means that technical staff should have administrative, legal, social and financial skills in order to have a strong coordination between advice on technical and financial issues.

One example of a successful implementation of Deployment Desk is the project Lourdes Renove in Navarra, finances by EU Programme CONCERTO, which led to the integrated retrofitting of an entire neighbourhood.

PARTNERSHIP FOR URBAN MOBILITY

The Partnership for Urban Mobility or PUM, as it is said in the Final Action Plan, aims to have a sustainable and efficient urban mobility. In order to achieve this goal four working groups with their respective actions were created. They are:

- Governance and Planning
- Public Transport
- Active Modes of Transport and Public Space
- New Mobility Services and Innovation

The following action has been chosen for its suitability with Calvià municipality issues, by being a potential solution to the problems in transport above described. It is the Action Nº 8 **"Exploring the deployment of New Mobility Services"**. It shows up proposing New Mobility Services (NMS) as a solution for the congestion, lack of space, toxic air quality and noise caused by the increased population and the overdependence on the private vehicle. In this way, the future of transport sees mobility as a combination of services aggregating travel data and communicating with the infrastructure around it. NMS refers normally to new kind of services such as car and bike sharing. The best way to give access to these services is via apps. The great potential of this action is the possibility to reduce car ownership fostering a more rational use of car. If managed properly it could benefit suburban towns where car dependency is high.

PUM aims to address certain challenges:

- Support cities and regional authorities to develop new approaches by researching needs and expectations of NMS.
- Support research on NMS impacts and their potential for decarbonisation, cleaner air, urban and rural transport and use of road space behaviour among others.
- Support pilots, research and innovation actions in small and medium sized cities.

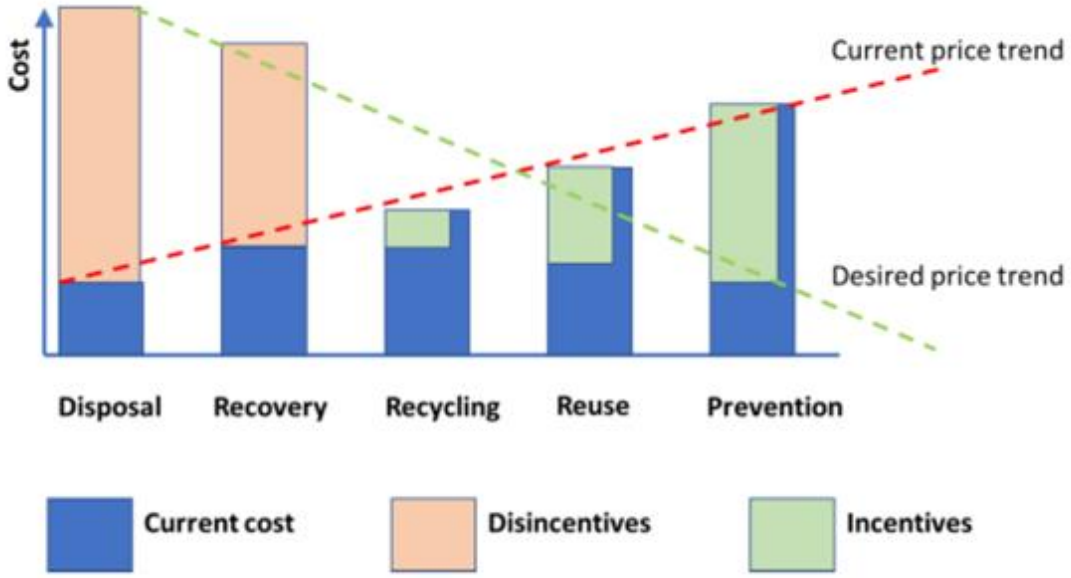
This action is in line with the one proposed in the Action Plan of the Circular Economy of the Urban Agenda for the EU, which is **"Develop a Collaborative Economy Knowledge Pack for cities".** It criticizes that currently the widespread connotation of Sharing Economy is limited to digital platforms like Airbnb or Uber. It defends that a Collaborative Economy pushes many Circular Economy initiatives, obtaining a circular consumption and CO2 decrease. This action proposes making a research by creating a better knowledge on the Collaborative Economy and disseminate it with the different stakeholders so they can operate with a better understanding and anticipation to possible negative impacts.

CIRCULAR ECONOMY

The Partnership of the Circular Economy has identified some actions which try to go through the existing barriers and also provide advice to cities in order to develop a circular economy. The goal is that inhabitants and entrepreneurs think in terms of resources with a permanent economic and social value rather than in terms of waste.

A key action that the Action Plan of the Circular Economy proposes is develop a **"Pay-as-you-throw" toolkit or PAYT**. The problem it addresses is the shift from a linear consumption-based model to a more services-oriented model, where the value is in the product as such and not in the ownership of it. The

way to reach it is by fiscal and financial stimuli. Local governments can increase the price of least favoured options or reduce the price of most favoured ones as shown below.



Graph 3 - The mechanism of financial Incentives for a circular economy (Source: Action Plan of the Circular Economy of the Urban Agenda for the EU)

In the graph 12 we can see the way to incentivise recycling, reuse and prevention, some common measures are taxes, levies and subsidies. PAYT is under the jurisdiction of the municipality and it consists on making the citizens pay a fee according to the amount of waste they produce. It can be done in two ways:

- Volume based taxation: using pre-paid garbage bags
- Weight based taxation: which requires a higher investment

Some advantages to highlight are the infrastructure can be finance through the PAYT income; achieving a higher recycling rates and higher level of environmental awareness. However, there are some important negative aspects: waste crimes like throwing the garbage in another municipality in order to avoid paying the fee and discrepancies on the cost of the fee.

• TWO CASES OF COMMITMENT

The **Clean Energy for EU islands** initiative aims to solve the issue that many islands in the EU depend on fossil fuel imports for their energy supply. It helps these islands to create an Agenda which is a roadmap for the transition process towards clean energy. This Agenda is design by local community, adapted to the situation of the island, considers the stakeholders and proposes initiatives and goals. We will get to know two cases: **La Palma** and **Culatra Island**.

LA PALMA

The vision of La Palma is:

"La Palma is a 100% renewable island thanks to a combination of clean technologies, energy storage and auto-consumption. Energy efficiency, demand reduction and sustainable mobility are the core of the energy transition"

La Palma is an island of the Canary Islands, in Spain, with a population of 82.000 inhabitants. In 2017 it was able to produce a 10% of renewable energy of the total energy produced in the island. In 2015, a citizen platform started the process towards a new energy model, which conclude in a manifesto. In response to the citizens' initiative, the parties of the island created the Plan Insular por una Nueva Cultura Energética (Insular Plan for a New Energy Culture or PINCE) which gathered the demands of the manifesto. In order to meet the goals, La Palma joined the Clean Energy for the EU islands project of the European Commission.
In 2019, it developed the first version of the **Clean Energy Transition Agenda** which is the roadmap to clean energy. The Agenda set the goals and the actions, and it was complemented by an online tool called **ClimateView**, which will help to ensure the transparency and participation of the stakeholders. This platform shows the updated greenhouse gas emission data of a certain area and classify them per sectors. We can see how it works in the figure 13:

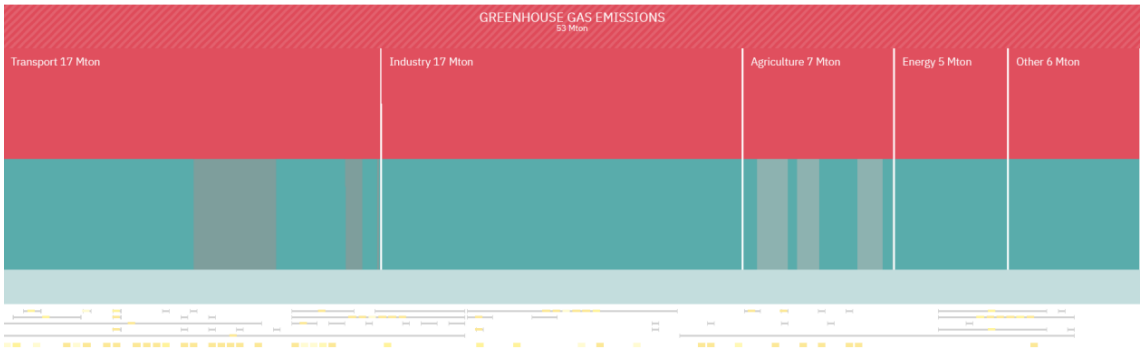


Figure 12- Example of ClimateView. (Source: Clean energy transition Agenda of La Palma)

The most significant part of the Clean Energy Transition Agenda is that it has always considered the stakeholders participation and the strategies and proposals are made by the citizens and the communities. In order to achieve this, a hundred stakeholders signed the document, and therefore were committed to participate in the elaboration of the final Agenda and to meet the goals; workshops by sectors were organized where the first ideas for the Agenda came up; later a transversal workshop where ideas were brought together and tasks were assigned; finally the groups involved are working in the development of the new Agenda.
The most recent outcome is the availability of the tool ClimateView in the island.

CULATRA

The vision of Culatra is:

"The vision of Culatra 2030 Initiative is to: create an energy community that manages and shares its own energy, before 2030, renewable energy will allow for a fully decarbonised electricity system; treat and value its waste; and produce fresh water for self-consumption."

Culatra island belongs to Faro municipality, in Portugal, and has around 1000 inhabitants. The island doesn't produce renewable energy at all, however 54,1% of the energy consumed is renewable since it comes from the mainland. The municipality joined the Covenant of Mayors in 2011, as well as Calvià,

committing to the same goals. However, it goes further joining the Clean Energy for the EU islands, which provides an additional opportunity to develop and implement a **Clean Energy Agenda for Culatra Island**. In the Agenda, it is recognized how the cooperation with Clean Energy for EU Islands Secretariat and other European regulatory authorities is essential for the operation of clean energy systems in the islands.
Some objectives and actions proposed are the following:

Objectives	**Actions**
Decarbonise the island's transport system by focusing on the socio-economic activities and solar-electric mobility.	Design with SunConcept a **boat/solar platform** by finding funding at regional, national and European level to invest in those boats.
Increase the energy efficiency and energy generation capability of buildings.	Creation of the **Green Sustainable Culatra2030 Fund**, which will allow residents to access a microcredit
Produce water for self-consumption	Dimension and operate a scalable **desalination water plant**.
Use island sustainability as a pillar for transition.	Create the **"Zero Plastic Zone" Seal**, a distinctive mark to be attributed to entities that demonstrate positive behaviours within the campaign, namely by reducing the use of plastic, by replacing single-use plastics; and implement innovative projects on waste management and treatment.

DISCUSSION

In this section, it will be discussed in the first place the goals Calvià has set in the last twenty years and they'll be compared with the ones proposed outside of the municipality. Secondly, the implementation of the proposals made in the comparative study will be considered.

In the first place, we will have a look into the goals that the Government of the Balearic Islands, the United Nations and the Alliance for Climate Emergency and we will discuss whether Calvià is close or not to meet them.

- Firstly, the *Ley de cambio climático y transición energética* of the **Government of the Balearic Islands** above described, proposes a greenhouse gas emission reduction of 40% and 90% by 2030 and 2050 respectively and renewable energy consumption of 35% and 100% by 2030 and 2050 respectively.
- Secondly, the **United Nations** proposes with the Sustainable Development Goals a 45% CO2 reduction before 2030 and zero emissions by 2050 and by 2030, increase substantially the share of renewable energy in the global energy mix. (Unknown author, s.f.)

- Finally, the **Alliance for Climate Emergency**, composed by NGOs such as Greenpeace, Extinction Rebellion, Fridays for Future Mallorca and the GOB, sets the goals the Municipal Councils of the Balearic Islands should sign in order to make effective the Climate Emergency Declaration. These are: 65% greenhouse gas emission reduction by 2030 regarding 1990 and zero emissions by 2040 and get rid of fossil fuels and use renewable energy as soon as possible. In addition, this group proposes not authorizing more developable land and the clearance of the developable land not performed; not allowing more road infrastructures; zero waste; and reduction in energy consumption among other proposals. (Alliance for Climate Emergency, s.f.)

The *Agenda Local 21* aimed to have in the best possible scenario 52.360 TOE of energy consumption by 2015, while in 1995 the energy consumption was 31.071 TOE (this mean an increase of 68.5%); 22% of renewable energy by 2015, while in 1995 there was a 0.2%; and 204.038 tonnes/year CO2 emission reduction, while in 1995 the municipality emitted 257.625 tonnes/year (it is a decrease of 26.26%). Here we see how the record of Calvià is not very in line with the goals above mentioned. Then the municipality set the goal of a 20% CO2 emission reduction of 2007 by 2020 in the Covenant of Mayors. And most recently, Calvià establishes a new goal with the Covenant of Mayors of 40% CO2 emission decrease by 2030.In the *APGOU 2017* the municipality sticks together with the Sustainable Development Goals and the *Ley de cambio climático y transición energética.* However, here it is demonstrated how the goals are different to the ones proposed by the United Nations. Furthermore, even if the same goal is set with the Government of the Balearic Island according to the CO2 emission, in the results section the evidences shown question the chance to reach it, for instance, the great investment in natural gas infrastructure which implied a high CO2 emission decrease to certain extent, but in the long term is not useful to meet more ambitious objectives. Finally, the municipality hasn't joined the goals of the Alliance for Climate Emergency and some of the practices demanded are being violated, such as the restrictions related to the developable land, with projects like the Ecobarri and dry marine Son Bugadelles, the Natural Park Magaluf marine and Ses Planes triangle.

In the second place,the comparative study has brought some tools, proposals and examples which if properly implemented in Calvià could lead to a positive change.

Firstly, the Urban Agenda for the EU offers its collaboration to local authorities to meet the Pact of Amsterdam goals. We have seen some actions which could be applicable to certain issues the municipality is facing:

- **"A new LIFE for urban adaptation projects"**: in the results of the thesis, we have seen the involvement of the municipality in several environmental initiatives related to territorial planning, transport and resources. Probably, Calvià would have done it better with a higher budget. We have seen how one of the most ambitious projects of the Agenda Local 21, the *esponjamiento*, was not successfully met as a result of the it high cost. This action aims to foster this kind of projects by providing a fund for urban areas
- **"Deployment Desks"**: the municipality has put great efforts into the energy efficiency, with the Strategy Calvià for the Climate, for example, in that shows its commitment. However, great projects are

planned such as the *Ecobarri* Son Bugadelles, Ses Planes triangle or the constructions in the Magaluf marine together with the need of retrofitting of great part of the municipality houses which contributes to the high energy consumption of Calvià. For this reason, implementing Deployment Desks which provide expertise advice could lead to a more efficient municipality.

- **"Exploring the deployment of New Mobility Services"**: Calvià struggles with its deficiencies in transport since the Agenda Local 21 and the problems are still the same as twenty years ago: lack of a good public transport network, high motorization index and lack of alternative means of transport. This absence of innovative proposals could be addressed by the NMS proposed in this action, which aims to reduce the overdependence on the private vehicle, improve the connectivity and decrease pollution caused by transport.
- **"Pay-as-you-throw"**: in the waste management section, we have seen how the great failure of the *Agenda Local 21* was the separate collection. This action could complement the *Plan de Prevención y gestión de residuos* of Calvià 2000 S.A, giving the municipality the chance to incentivise recycling, reuse and prevention by implementing fiscal and financial stimuli.

Secondly, the two cases presented are examples of two islands with similar conditions to the Calvià municipality, which have adopted the Clean Energy for the EU initiative and have set ambitious objectives. The goal is that they serve as inspiration and model to follow to Calvià. We could highlight of each of them:

- **La Palma**: it sets the vision of a 100% renewable energy and starts to create the Agenda to meet this goal. One of the principles of the Agenda is the community and stakeholder's participation, which helps to the commitment of the different parts with it. A key action has been the implementation of the ClimateView tool, in order to promote transparency and participation. In Calvià, the lack of renewable energy is an issue, we have already seen it in the energy consumption section. La Palma situation is similar; however, it has set a strategy to address it in a different way, and Calvià could uses benchmarking.
- **Culatra**: it aims to produce its own energy by using renewable energy, treat its waste and produce water for self-consumption. The current situation of the island is far from its goals; however, many initiatives are on the table. The Clean Energy Agenda for Culatra Island sets concrete objectives and actions. Some of these actions are quite innovatives and Calvià could consider the possibility to study their implementation. Here again, Calvià could uses benchmarking with Culatra.

FINAL CONCLUSIONS

In the present document, we have analysed the evolution of Calvià by sectors, studying the most significant initiatives and drawing some individual conclusions of them and we have also gone over a comparative study, in which some interesting proposals, which could be implemented in the municipality, have been described.

The research done has sought an answer to the research questions asked at the beginning. The set of the conclusions reached in every section of the thesis puts together an answer considering every aspect studied.

- **¿Is there an actual commitment of the municipal council to the environment? And if it is the case, ¿is it doing its best?**

We have seen how Calvià is putting great efforts to create a more sustainable municipality and it shows its awareness, however in order to conclude if there is an actual commitment or not, different aspects should be considered. According to the territorial planning, the political action has redirected the route that was leading the municipality to the collapse in the 20th Century. However, many of the proposed objectives have not been reached such as the proposal of a comprehensive rehabilitation of the coastal space and the current projects of urban development which counter with the Agenda 21 goal of the developable land reduction. In addition, the municipality is not performing ambitious projects such as the attempt of *esponjamiento* or any other new proposals which are missing. As a result of that, we can conclude that even if there is a commitment in this point, the optimal scenario has not been achieved. In relation to the transport, we are currently struggling with the same issues than twenty years ago such as the deficiencies in the public transport and the car dependency, while the multiplication of the road network is still a fact. There is also a lack of innovative proposals since the key project of the municipality is still the *Passeig Calvià*. In this case, the municipality can't be considered to be committed with the cause and it is far to do its best. In general, Calvià is more energy efficient than before as demonstrated in the previous analysis mainly at expense of the implementation of the natural gas and some good initiatives has been performed being the *Covenant of Mayors* the most significant one. However, the goals set in this area are quite low and far to reach the zero emissions and the energy self-sufficiency, focusing mainly in the 20% of CO2 emission reduction by 2020. Then, the commitment can't be denied, but clearly, it's not doing it best. Our outcome of the water management proves that the data of water consumption are slightly better since the water consumption per person is lower today than twenty years ago, but some of the goals have not been met, for instance, the one of the deployment of tertiary systems in treatment plants in Calvià. Some other objectives have been stalled like the urban recycling water of 11% by 2007, which in 2018 was a 12%. Here we have again the case of commitment with the objectives, but not even close to the best possible scenario. Finally, there is the waste management, in which despite the current situation in some cases is better than the one expected, for example reaching the sustainability scenario according to the waste generation, the great deficiencies such as the separate collection shadow the successes that this sector could had. Therefore, considering the recent *Plan de Prevención y gestión de residuos* of Calvià 2000 S.A, even if the management could have been much better, we trust in the engagement of the municipality to create a positive impact in the following years.

- **¿Where should it head from now on?**

Based on the conclusions we had of the results of the municipality management in its different sectors and the comparative study we did afterwards, we can get some ideas. We have concluded that there is an actual commitment of the municipality with the environment in most of the sectors. However, the issues that are being faced, are not easily solved. Most of the time, the same initiatives

are proposed year after year due to the lack of innovative proposals. We have also seen how the Covenant of Mayors brought Calvià clear goals and a helped for the elaboration of an Action Plan. These two statements empower the idea that Calvià should join an international group of expertise. The Urban Agenda for the EU could be a good option. It would complement the work the municipality is already doing by setting ambitious goals, providing new tools such as the ones previously explained, helping to create a roadmap and ensuring its achievement by monitoring its performance. Finally, cooperation with other municipalities is necessary. The establishment of a network where transparency prevails and the different municipalities can benefit from the each other information by using benchmarking, could help to face similar issues. Here is where the cases of La Palma and Culatra could serve as an example for Calvià.

To put it in a nutshell, considering the municipality has shown commitment to the environment in many cases, it has not met every objective even taking into account some of them were quite low, it is not leading to the best possible scenario due to it's not setting the most ambitious goals and some good practices such as the ones shown in the comparative study are being ignored, **we will grade Calvià municipality with a 6 out of 10.**

Finally, this thesis has put on the table a topic which affects many people whether they live or not in Calvià and which can be extrapolated to other municipalities. The work dedicated will have been worth if people who read it become aware of the importance of a good environmental and territorial planning and management. In addition, the thesis encourages the Municipal Council of Calvià to study the recommendations made.

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