Cost Efficient Options and Financing Mechanisms for nearly Zero Energy Renovation of existing Buildings Stock

DELIVERABLE 2.3

REPORT SUMMARIZING OBSTACLES, RISKS AND DIFFICULTIES FOR THE RENOVATION SCHEMES

Municipality of Errenteria, Spain

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
AHU	Air Handled Unit
COP	Coefficient of performance
EPBD	European Performance Buildings Directive
HVAC	Heating Ventilation Air Conditioning
ICT	Information and Communication Technology
nZEB	Nearly Zero Energy Building
PUR	Polyurethane
PV	Photovoltaic
RES	Renewable Energy Sources

CERTUS PROJECT IN BRIEF

Southern European countries undergo a severe economic crisis. This hinders the compliance to the latest Energy Efficiency Directive, demanding strict energy efficiency measures for the public sector. Investments required to renovate public buildings and achieve nearly zero energy consumption have long payback times. So the interest of financing entities and ESCOs is small, especially when banks have limited resources. Many of the municipal buildings in Southern Europe require deep renovations to become nZEB and this should not be regarded as a threat but rather as an opportunity for the energy service and the financing sector.

The objective of the proposed action is to help stakeholders gain confidence in such investments and initiate the growth of this energy service sector.

Municipalities, energy service companies and financing entities in Italy, Greece, Spain and Portugal are involved in this project. The plan is to produce representative deep renovation projects that will act as models for replication. Twelve buildings in four municipalities in each country have been selected. The partners will adapt existing energy service models and procedures and will work out financing schemes suitable for the 12 projects. Consequently, the partners will create materials, such as guides and maxi brochures, suitable to support an intensive communication plan.

The plan includes four workshops with B2B sessions targeted to municipalities, ESCOs and financing entities. These actions shall be complemented by four training activities targeting municipal employees and the participation in international events targeting all 3 stakeholders. We expect that our action will have a significant impact by triggering investments in renovations to achieve nZEB and the uptake of the ESCO market in Southern European member states.

EXECUTIVE SUMMARY

This deliverable is part of the work carried out in Work Package 2 "Technical and Economic Validation of the nZEB Renovation Schemes" and summaries the obstacles, risks and difficulties for the renovation schemes for each building addressed in the four Municipalities.

This document presents the obstacles, risks and difficulties for the renovation schemes in the Municipality of Errenteria. The three buildings are presented, according to the following structure:

- Brief introduction to the building: main typological characteristics, location, use and energetic profile, etc.;
- Short presentation of the selected renovation scheme, including presentation of adopted measures;
- Technical difficulties envisaged for the implementation of the proposed solutions;
- Economic and/or financial risks to be considered;
- Legislative obstacles considered in the selection of the renovation schemes.

At the end of each Section, a summary of the actions is presented, as well as the main conclusions for the Municipality of Errenteria.

The main technical barriers encountered in the renovation scheme design are related to the physical characteristics and the use patterns of the buildings. In the case of *Kapitain Etxea* building, the small dimensions of the building determine the selection of some technologies; in the case of the City Hall, the use of the building by Municipal employees and the public limit the selection of intrusive measures which would require the closure of the building; while in the case of *Lekuona* building the ongoing renovation already addresses some of the objectives pursued in this project.

The main economic barrier of the implementation of the renovation schemes is related to the lack of public budget and low availability of financial mechanisms, while main legislative obstacles are associated on one hand to the restrictions applied to the historic town, listed due to its historical and aesthetical values and on the other hand to the current unclear legal situation of PV technology as, since 2013, the funding of PV panels was abolished retroactively.

1. OBSTACLES, RISKS AND DIFFICULTIES FOR THE RENOVATION SCHEMES IN ERRENTERIA

1.1. KAPITAIN ETXEA

1.1.1. INTRODUCTION

"Kapitain Etxea" (Figure 1), the Captain's House, is a small building erected in the 17th century located in the historic centre of Errenteria town (*Erdialdea* in Basque language). It is a three storey building made of thick stone ashlar walls with a horizontal timber post and beam structure and sloped timber roof.

Kapitain Etxea was part of a larger building. However, the original one was divided internally creating two different constructions and, the fact that both of them share the main façade, is the only trace of this former building. The building has total gross area of about 394,89m^2 with a total used surface of about 341,20 m^2 (non-occupied loft is not considered) and a volume of 1361,86 m^3.

FIGURE 1: KAPITAIN ETXEA MAIN FAÇADE.

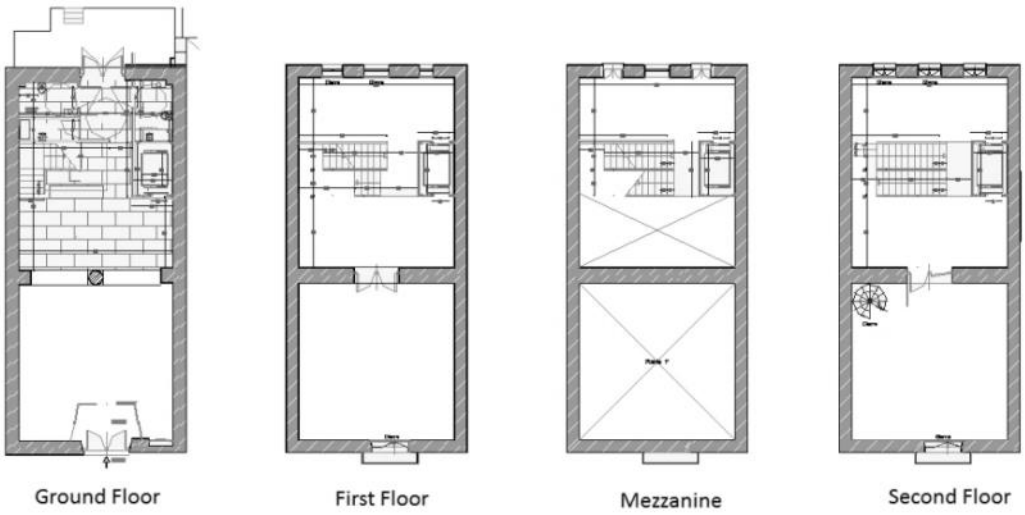

FIGURE 2: KAPITAIN ETXEA PLAN VIEW

The building was renovated for the last time in 1984, mainly the roof which was partially substituted, with the insertion of a skylight. Since then it has had different uses such as cultural centre. Currently, it is used for administrative activities, it houses part of the municipal archive and it does not have a defined use because of difficult access and thus restricted to municipal employees. The Municipality of Errenteria has decided to give it a new use, by placing the Museum of the Basque Costume with an opening time from 10am to 8pm. The idea is to use this circumstance to renovate the building according to nZEB standards.

The Old Town is formed by narrow streets, almost alleys, a common pattern in old districts of the Basque Towns (Figure 3). This means low sun exposure on the streets and façades and roofs of the buildings.

The current use profile of the building, which is only used for sporadic or punctual enquiries, leads to an irregular pattern of consumption. In 2013 the building had an electricity consumption of 4.916 kWh and an associated running cost of about 760 €. The heating system is connected to a gas boiler of the City Hall, close to Kapitain Etxea. However, it is not used and there is no cost associated to it.

FIGURE 3: OLD TOWN STREETS.

1.1.2. RENOVATION PLAN

As Kapitain Etxea is going to have a new use, a Museum, the hydrothermal and comfort conditions for this activity will require additional systems which will cause an increase of the energy demand. The renovation plan will be focused on three concepts: energy demand reduction through the envelope, use of energy efficient systems and inclusion of Renewable Energy Sources (RES).

Energy demand reduction

This is achieved by reducing the thermal transmittance, i.e. U-value, of the opaque envelope (walls, roof and ground floor) and transparent surfaces (windows and balconies). Timber roof will be replaced by a similar one with more insulating material while external walls will be covered internally with insulating material (PUR in both cases). The ground floor as been designed to improve its insulating capacity and to avoid capillarity humidity coming from the soil below the building. Windows and

balconies, single-glazed, will be replaced by more adequate double glazed air filled fenestrations (4-16-4mm, low-e coated, air filled).

Energy efficient systems

Current heating system will be dismantled and separated from the City Hall. Due to the building's characteristics, an Air Handled Unit (AHU) that combines all the HVAC systems (ventilation, heating and cooling) has been selected.

The lighting system will be renewed by the replacement of current lamps and luminaries with LED technology.

Renewable Energy Sources

PV panels will be installed on the building roof, which will generate around 3.388 kWh.

1.1.3. Technical Difficulties

Due to the small dimensions of the Kapitan Etxea building, most of the technical difficulties are related to the lack of space and surface for the proper installation of new systems. Furthermore, due to its location in the Old Town of Errenteria, the building is listed and restrictions in the renovation project are applied. The change of use of the building also represented a technical difficulty in the elaboration and evaluation of the renovation plan, as operational conditions were not representative for the new proposed use.

Envelope

The selection of the insulation system for the reduction of thermal transmittance of the walls has been mainly driven by the restrictions associated to listed buildings. In Kapitan Etxea, it is not possible to add insulation in the outermost surface, as changes in the exterior appearance are not allowed and an intervention in the inner surface has to be chosen.

As mentioned before, due to the small dimension of the building, systems are required to minimally reduce the useful surface. For this reason, a solution based on internal insulation and mortar has been selected. This will cause some drawbacks, such as limitation in the installation of ornaments and decoration due to the thickness of the render, and the substitution of the current heating and electric system, mainly radiators and sockets (Figure 4).

FIGURE 4: SOCKETS, CABLES AND HEAT RADIATORS IN WALLS THAT WILL BE REPLACED.

Moreover, the intervention in the inner surface should be done carefully, especially in singular points such as the connections with openings and slabs, as an improper execution could lead to the formation of undesirable thermal bridges.

The state of conservation of the roof is very poor and it will be entirely replaced. A new but similar timber roof, with the same aesthetical characteristics, but with improved insulation and waterproof properties is foreseen. With respect to the current typology, made of ceramic tiles, timber purlin and flooring, it will also include a breathable sheet, PUR and vapour barrier.

Currently, the ground floor slab is made of cast concrete in direct contact with the soil and is affected by capillarity humidity worsen by high groundwater level. In order to insulate the ground floor, current concrete will be removed and replaced by a more adequate solution made of gravel, concrete and PUR, including air cavity. The proposed solution will have a bigger thickness but, due to the location of the building in a conservation area, excavation should be avoided, as archaeological studies might be necessary.

HVAC System

Space is also decisive in the selection of the HVAC system. Since additional ventilation and cooling system is required to comply with regulations and comfort conditions, keeping the current heating system based on high temperature water radiators would imply additional reduction of the useful surface. In order to overcome this circumstance, it has been considered as convenient, to combine the three systems (ventilation, heating and cooling) in a single one.

Lighting

The new system will be based on LED technology, with no major technical difficulties. As the walls thermal performance will be improved by inner surface insulation, the lighting system will be renovated by taking advantage of the circumstances generated by the execution of the insulating works.

PV Panels

The installation of PV panels presents the same difficulties of the other interventions, as the roof surface is around 147 m^2 and may not be enough to host the necessary amount of panels to achieve a satisfactory rate of energy produced by RES.

Another problem related to PV panels and Kapitain Etxea roof is the performance of the panels during all the year. The building is located in a close urban pattern, with narrow streets and low sun exposure. In autumn and winter, the lower altitude of the sun causes the sunlight to hit the roof in a more oblique angle than in summer (Figure 5 and Figure 6). This has an undesirable effect when the roofs of the adjacent buildings limits the direct incidence hours, reducing the produced electricity and the performance of the panels.

Furthermore, the building is not perfectly oriented to south, presenting an azimuth of 60º. Despite the reduction of the production, the PV panels should be installed according to the orientation of the building in order to minimize the visual impact.

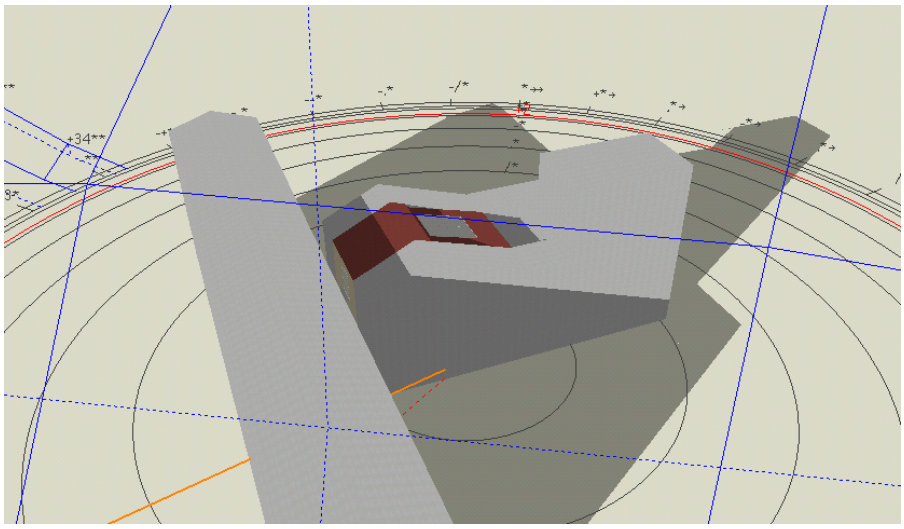

FIGURE 5: SIMULATION OF THE SOLAR INCIDENCE ON KAPITAIN ETXEA AT 14PM ON 21ST OF DECEMBER

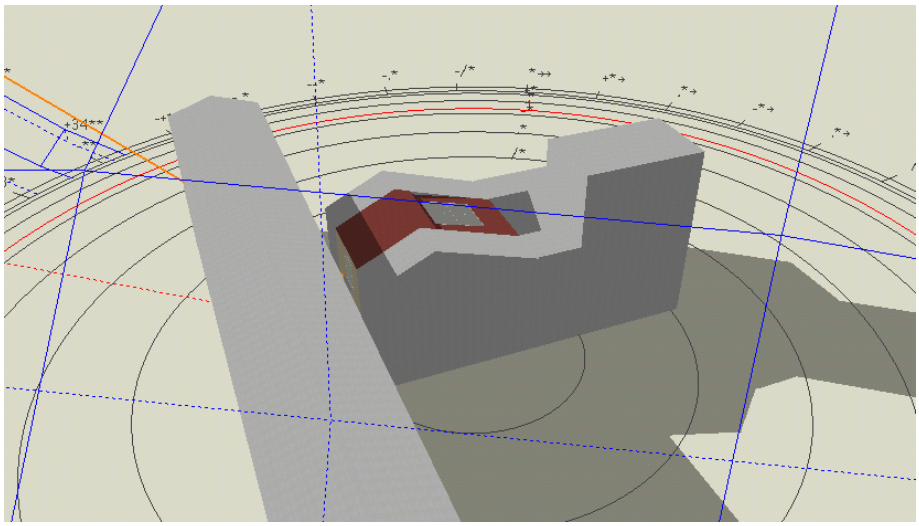

FIGURE 6: SIMULATION OF THE SOLAR INCIDENCE ON KAPITAIN ETXEA AT 17PM ON 21ST OF JUNE

Other possible RES

One considered possibility is to install micro-CHP for the heating system. This could be a feasible option if that system would be supplied by a boiler. Since in this case an AHU system has been chosen, the use of cogeneration within this project is not possible.

Other solutions such as geothermal pumps are also rejected. The small area of the building plot may not be enough to achieve a significant contribution to the heating system and the investment will not be justified. Moreover, its installation could be difficult due to the presence of a high groundwater level and the results of the archaeological study.

1.1.4. ECONOMIC/FINANCIAL RISKS

The main problem of the adopted measures is their payback time but, as the building has limited dimensions, there is no need of major investment.

The retrofitting of the building's envelope, opaque and transparent surfaces, will generate an important reduction of the energy demand, with respect to a building with the same use and less envelope's improvement. On the contrary, despite the prices of PV panels in the Spanish market are constantly decreasing, the particular location and environment of the building reduces their performance.

These problems are aggravated by the lack of public budget and the low availability of financial schemes.

1.1.5. LEGISLATIVE OBSTACLES

The Old Town of Errenteria has been listed due to its historical and aesthetical values. In the case of Kapitain Etxea this entails that the external walls of the building, the one that adjoins Kapitanenea Street has to be preserved with no alterations. As the windows and fenestrations were changed in the 80s they do not have any restriction and can be replaced by new ones whenever are representative of the typologies of the area.

In line with the use of PV panels it is necessary to underline that the legal situation of this technology is not clearly defined. Up to year 2012 the use of PV panels was partially funded, then by the RDL 1/2012 the bonus was abolished for new installations. One year later, in 2013, the bonus for the already existing PV solar systems was also abolished retroactively.

http://www.boe.es/boe/dias/2012/01/28/pdfs/BOE-A-2012-1310.pdf

The same year the Spanish Government issued a draft law project about the use of PV technology for self-consumption. Here the use of PV panels is drastically limited by a series of fees that penalize the cost effectiveness of the installed system, e.g. a toll for each kWh produced. Additionally, the produced electricity that is not consumed must be dropped in the net without compensation. Finally, this draft entails that every system must be registered with penalties between 6 and 60 €millions if this requirements is not fulfilled. This draft, that has not been approved, maintains the sector in an uncomfortable and not defined situation.

This draft project can be found at: https://docs.google.com/file/d/0B3UQDdeVgDRrVlZUYjU2anBTU2M/edit

1.2. CITY HALL

Errenteria City Hall is the Municipality's headquarter (Figure 7). It is a building created at the end of the 20th century by an ambitious project where the former City Hall, erected in the 17th century, was deeply renovated and merged with other two existing buildings. The current City Hall shows this particularity by means of mezzanines, different levels at the same floor and not-aligned windows. The resultant building combines traditional architecture, keeping its ancient origin, with modernity.

The building has total gross area of about 2.961 m^2, with a total used are of about 2.253 m^2, and a volume of 11.418 m^3.

FIGURE 7: ERRENTERIA CITY HALL

In the last renovation, performed in 2000, the building was conveniently renovated. Walls, even the old thick ones, were properly insulated; openings were equipped with appropriate frames and glazing; modern electric and lighting system; and convenient HVAC systems.

The City Hall is mainly constituted by offices and an archive and it has occupation between 7h30 and 15h00 (Monday to Friday), except some exceptional moments when some staff members have to stay more time in the building. The building is open for public access between 9h00 and 13h30.

In 2013 the building had an electricity consumption of about 146,5 MWh and an associated cost of about 23 k€. The heating system is gas based, with a consumption of 131 MWh and an associated cost of 7.227 €.

The City Hall is also located in the Old Town (Figure 8), in fact very close to Kapitain Etxea. Again, this means low sun exposure on the streets and façades and roofs of the buildings, especially due to the presence of the church just in front of the main wall of the building (south orientation).

FIGURE 8: HERRIKO PLAZA, WITH THE CHURCH.

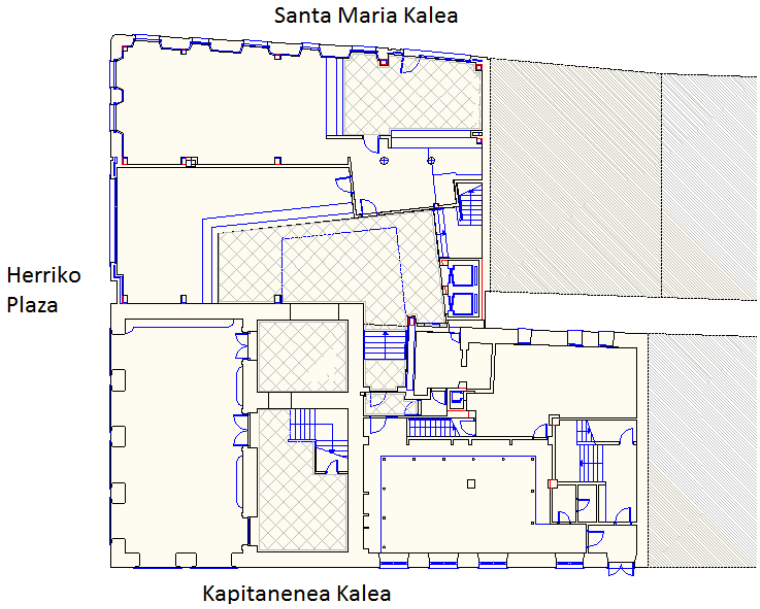

FIGURE 9: CITY HALL'S GROUND FLOOR PLAN VIEW

1.2.1. RENOVATION PLAN

As the building was recently renovated it is not expected to act in the envelope. Walls, roof and windows present acceptable thermal transmittance values so their improvement would entail big investments with low impact. Thus, the renovation plan aims to improve the efficiency of the energy systems and foster the use of RES.

Energy efficient systems

Efficiency of the heating system will be improved by installing a high COP condensing boiler with an adequate power capacity according to the actual thermal demand.

Cooling system is formed by multi-split systems, which is more efficient compared to mono-split ones. The system is quite new and its use limited to some areas. However, its efficiency can be improved by limiting its operating time by means of sustainable criteria.

Finally, the power consumption of the lighting system is reduced by replacing the existing lamps by LED technology.

Renewable Energy Sources

PV will be installed on the roof of the building, with a generation of around 38.757 kWh per year.

1.2.2. TECHNICAL DIFFICULTIES

The building has an intensive use, receiving a large number of visitors, and is the working place for a large number of Municipal employees. For this reason, as main criteria, interventions should be as less intrusive as possible.

Lighting

Most of the rooms have a ceiling where the luminaries are inserted. The inclusion of LED technologies in the renovation project requires for two possibilities, the replacement of lamps or the replacement of the luminaries. The first option, the replacement of the lamps, is usually selected when luminaries still have a considerable remaining life or to avoid extensive works. This is the case of the City Hall, where lighting system is relatively new. However, it is necessary to find lamps compatible with these luminaries, which is not always possible.

PV Panels

Some areas of the roof are shaded due to the presence of different roof levels. This can be observed in the simulations of solar incidences included in Figure 10. This occurs mainly in the lower level of the building, and would limit the performance of the PV panels installed. Nevertheless the roof has enough surface area and the installation can be carried out in the higher eaves.

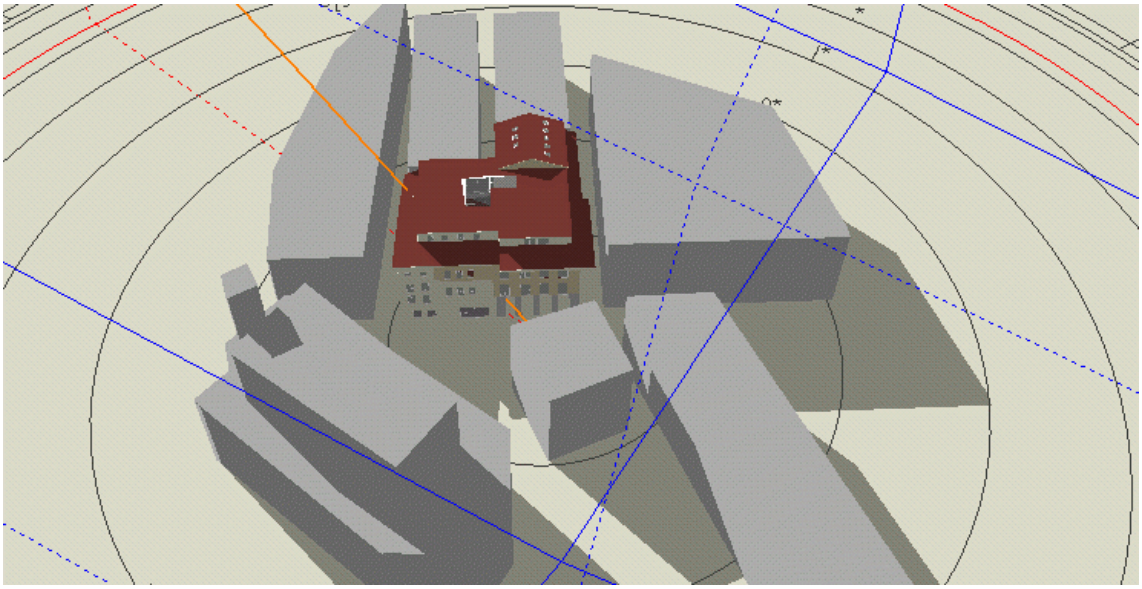

FIGURE 10: SIMULATION OF THE SOLAR INCIDENCE ON THE CITY HALL AT 17PM ON 21ST OF JUNE

In the same line, the near buildings, especially the church, project shadows over some areas of the City Hall's roof in autumn and winter, as shown in Figure 11, limiting the direct incidence hours and reducing the produced electricity and the performance of the panels.

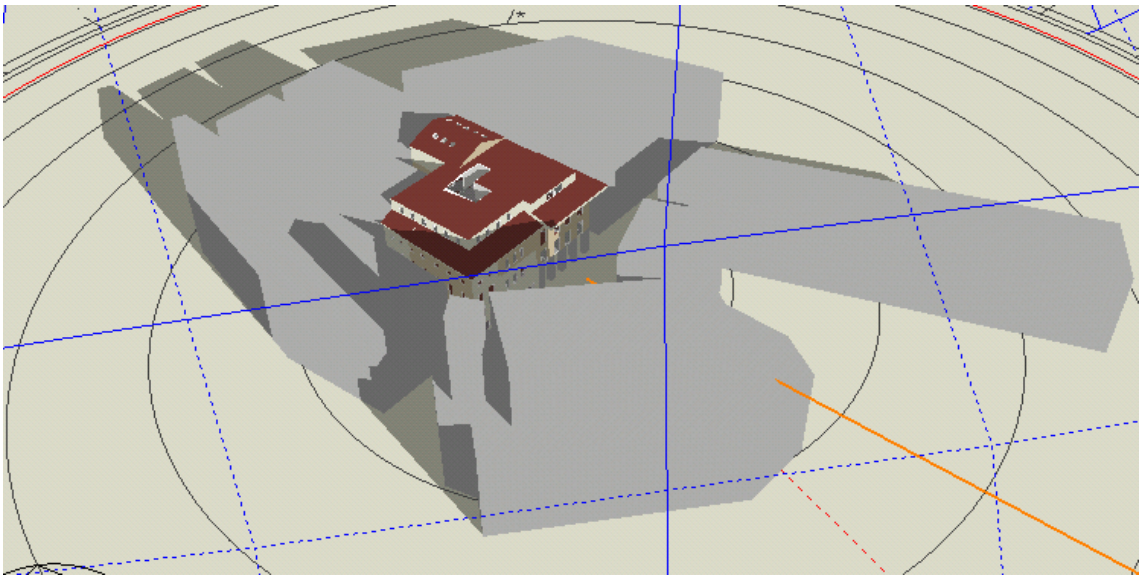

FIGURE 11: SIMULATION OF THE SOLAR INCIDENCE ON THE CITY HALL AT 10AM ON 21ST OF DECEMBER

Moreover, the building is not perfectly oriented to south, presenting an azimuth of -25º in some pitched floors and 60º in the others. Despite the reduction of the production, the PV panels should be installed keeping the orientation of the building in order to minimize the visual impact, in agreement with the restrictions applied to the historic centre.

HVAC systems

As previously described, the heating system of the City Hall is currently providing service both to the Municipal building and to Kapitan Etxea building. In accordance with the new use of Kapitan Etxea, the system will be separated and will only operate for the City Hall. This low efficient boiler, that would result oversized for only one building, will be replaced by a new more efficient condensing boiler, dimensioned to cover the City Hall thermal demand.

Ventilation systems and air conditioning devices are quite modern, with well distributed ducts, and their replacement will not contribute to significantly improve the efficiency of the systems, especially if compared with the costs associated to the upgrade. Eventually, a detailed inspection of pipelines might lead to the modification of some pieces with the objective of reducing energy losses.

Other possible RES

The possibility of including geothermal pumps for the heating system in the renovation plan has been rejected. Firstly, the ground level of the City Hall has a considerable activity and the installation of this technology would entail the interruption of basic municipal services. Moreover, its installation would affect the effectiveness of the ground level paving erected in the 2000 renovation. This problem can be combined with the presence of a high groundwater level and is related with the archaeological study's results.

Installation of a CHP in the heating system has also been considered. Nevertheless, this technology results as cost-effective if the running time of a building is around 6,000 hours/year. In the case of the

City Hall, the use profile of the building can be calculated as 2,500 hours/year, being far below from the reference value.

1.2.3. ECONOMIC/FINANCIAL RISKS

The equipment installed in the City Hall can be considered as modern and with a considerable remaining life time. Its efficiency might be improved by raising awareness of the final users. To teach and implement good habits among the users could be as effective as the replacement of expensive equipment. However, the effect of this kind of measures cannot be easily quantified in advance.

The lack of public budget and the low availability of financial schemes can reduce the possibilities to implement the proposed renovation scheme.

Besides, as the excess of electricity produced by PV panels is not paid in Spain, the payback periods of this technology might be long.

1.2.4. LEGISLATIVE OBSTACLES

The Old Town of Errenteria has been listed due to its historical and aesthetical values. In the case of Kapitain Etxea this entails that the external walls of the building, the one that adjoins Kapitanenea Street has to be preserved with no alterations. As the windows and fenestrations were changed in the 80s they do not have any restriction and can be replaced by new ones whenever are representative of the typologies of the area.

In line with the use of PV panels it is necessary to underline that the legal situation of this technology is not clearly defined. Up to year 2012 the use of PV panels was partially funded, then by the RDL 1/2012 the bonus was abolished for new installations. One year later, in 2013, the bonus for the already existing PV solar systems was also abolished retroactively.

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1.3. LEKUONA

1.3.1. INTRODUCTION

Lekuona is an ambitious project of the Municipality to transform a former industrial building (Figure 12) into a modern cultural centre. The idea is to preserve the essence of the building in order to keep a memory of the industrial past of Errenteria.

Thus, a new building has been designed according to nZEB standards using the original building as a solid starting point to erect an edifice that will be a reference in the whole Basque Country. Currently, the building is being erected.

Due to this already designed deep renovation project that is being carried out, it can be considered that few improvements can be achieved. However, it have been detected some actions that can be implemented to reach even better results. Moreover, considering the willingness of the Municipality to improve the efficiency of its municipal buildings, the measures that are proposed in the frame of CERTus project will be considered in the near future.

The resultant Lekuona building has total area of about 2818 m^2.

FIGURE 12: SOUTH FAÇADE OF LEKUONA BEFORE THE RENOVATION WORKS STARTED

Part of the building is protected by the Spanish Coastal Law. This means that part of the building cannot be demolished and its aesthetic aspect must be preserved. This fact was considered during the design process and must be considered in the renovation aspect that will be included within this project.

The main difference with Kapitain Etxea and the City Hall is that Lekuona is not located in the Old Town. In fact, it is placed in the shore of the Oiartzun estuary (this is why it is affected by the Coastal Law), and no important buildings or structures border the studied building.

1.3.2. Renovation Plan

The building that is being erected has been designed to obtain an A certification according to the mandatory document (DB-HE, Documento Básico de Ahorro de Energía – *Basic Document of Energy Saving*) included in the Spanish Technical Building Code.

For this reason, Lekuona has an excellent behaviour in terms of energy efficiency. The envelope, that has to be maintained, has been properly adapted and the new one has been designed conveniently. In the same line, openings glazing and fenestrations are properly selected. The same can be said of energy systems (HVAC and lighting). In fact, the heating system is fed by a biomass boiler, a Renewable Energy Source.

This important work can be complemented by adding more renewable energy sources in order to improve the autonomy of Lekuona according with the nZEB philosophy.

Once the building has been modelled and simulated, the renovation project proposed in CERtuS is based in the use of PV panels to reduce the electric demand. The building is well oriented and there is an important roof surface to install the necessary equipment.

1.3.3. Technical Difficulties

The main technical difficulties are found in the existence of a real renovation scheme that is being developed. Thus, it is “difficult” to achieve more results in this line.

As it has been commented, the observed possible actions are focused in the use of Renewable Energy Sources, PV solar panels, to reduce the dependence of the building. Lekuona is not perfectly oriented to south, presenting an azimuth of 35º. Despite the reduction of the production, the PV panels should be installed keeping the orientation of the building in order to minimize the visual impact.

1.3.4. Economic/financial risks

The Municipality of Errenteria has done an important budgetary effort to finance and carry out the current renovation scheme. Thus, the idea of implementing more measures when the project is finished can be risky.

Besides, as has been commented in previous buildings of Errenteria, the excess of electricity produced by PV panels is not currently paid in Spain, so the payback periods of this technology could be long.

1.3.5. Legislative obstacles

Part of the building is protected by the Spanish Coastal Law 22/88 (1988). By means of this law, the area up to 20 meters from the estuary’s shore is protected (Figure 13). In case of demolishing, the new building would have to respect the obligation of this law. http://leydecostas.es/pdf/ley-de-costas-1988.pdf

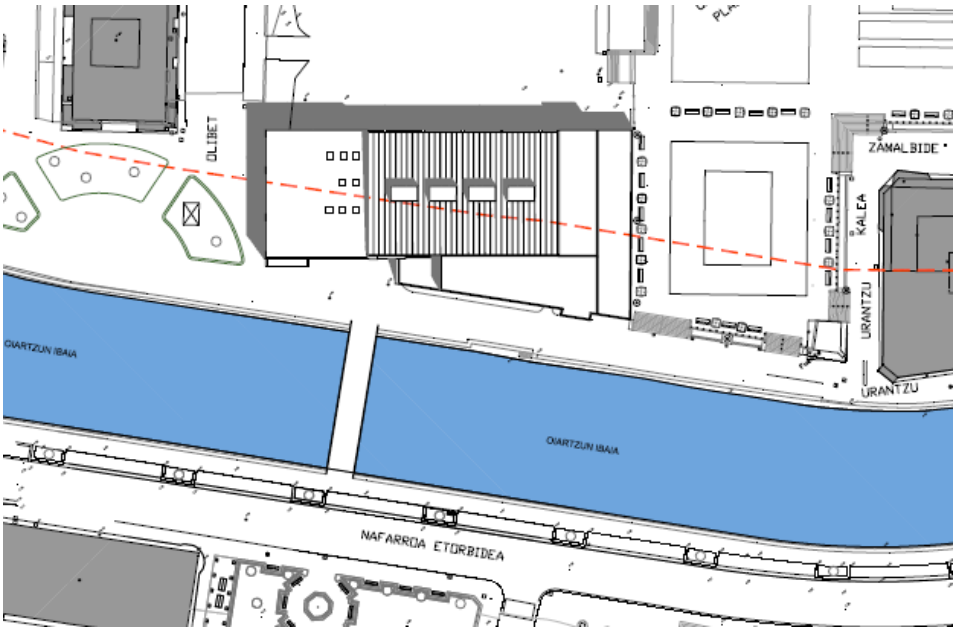

FIGURE 13: PLAN MAP OF THE POSITION OF LEKUONA AND THE OIARTZUN ESTUARY, IN ORANGE THE LINE THAT LIMITS THE PROTECTED AREA.

Thus, the parts included in the protected area are only repaired in the renovation project that has been approved by the Municipality. The new parts of the building, included in the commented project, are out of the protected area; this is consequent with the contents of the Coastal Law.

Finally, related to the use of PV panels it has already been commented that the legal situation of this technology is not currently well-defined. Up to year 2012 the use of PV panels was partially funded, then by the RDL 1/2012 the bonus was abolished for new installations. One year later, in 2013, the bonus for the already existing PV solar systems was also abolished retroactively.

http://www.boe.es/boe/dias/2012/01/28/pdfs/BOE-A-2012-1310.pdf

The same year the Spanish Government issued a draft law project about the use of PV technology for self-consumption. Here the use of PV panels is drastically limited by a series of fees that penalize the cost effectiveness of the installed system, e.g. a toll for each kWh produced. Additionally, the produced electricity that is not consumed must be dropped in the net without compensation. Finally, this draft entails that every system must be registered with penalties between 6 and 60 €millions if this requirements is not fulfilled. This draft, that has not been approved, maintains the sector in an uncomfortable and not defined situation.

This draft project can be found in:

https://docs.google.com/file/d/0B3UQDdeVgDRrVlZUYjU2anBTU2M/edit

1.4. SUMMARY

The Municipality of Errenteria is deeply involved and committed with energy efficiency strategies. Two of the buildings included in this project are currently being renovated. Their former use (one as part of the municipal archive and other abandoned) has been replaced for more active purposes (museum and dance school respectively). Actually, this is an important limit to achieve the aims of the project. When the use of a building is drastically changed, as happens in Kapitain Etxea and Lekuona, the energy consumption also changes. In this specific case, this consumption will be increased, so the aim of reduction cannot be achieved and it is necessary to work with parallel scenarios. However, it is necessary to underline that this situation is not unique and can occur in more public buildings. The use of public buildings with considerable historical value that are partially abandoned is a positive policy to keep the identity of villages and cities.

As for other countries, the public procurement process in Spain can lead to some technical risks associated to uncertainty of the quality of materials and technologies used by installers. Currently, there are projects focused on developing innovative formulas to overcome this problem.

Another technical barrier encountered in the project is the location of the buildings. They are part of the Old Town of the district, where lack of space and low solar incidence are a constant feature. Besides, the irregular pattern of the distribution causes that most of the roofs present azimuth values that reduce the performance of solar PV panels. Furthermore, the historic centre of Errenteria is listed, while the Lekuona building is affected by the Coastal Law and some restrictions in the use of specific technologies are applied (e.g. insulation can be applied only in the inner side of the building).

Economical/financial risks are related to the investments and the lack of public budget. These problems, in combination with large payback periods, complicate the access to acceptable financial schemes. The constant changes in the price of energy that are registered in Spain increase the uncertainty for this kind of investments, this can affect to key indicators such as payback periods.

The main legislative obstacle is related to the use of PV technology to produce electricity. Currently there is a draft project that limits the capacity of buildings to install PV system for self-consumption of electrical energy. For this reason, this sector is partially stationary due to the uncertainty of the situation, without a mandatory rule and with a provisional project. However, this draft has not been approved since it was issued in 2013 and it is questioned by important sectors of the politics, industry and society. An eventual change in the Government could entail its modification or its revocation.

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Municipality of Errenteria (ES)

Municipality of Coimbra (PT)

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