Action Plan of the CLEAN project:

Technologies and open innovation for low carbon regions

Action Plan for the Energy Efficiency improvement through ICT in Donostia / San Sebastian city, Basque Country (Spain)

3 – Fomento San Sebastian

Contents

1 Executive Summary

This action plan has been developed under the CLEAN[1] Interreg Europe project framework by Fomento de San Sebastian[2] (FSS) partner and is framed as part of the transition process which is taking place in the city of Donostia – San Sebastian, with the objective to transform it in a smart city reference following sustainable parameters. This transition is led and fostered by FSS.

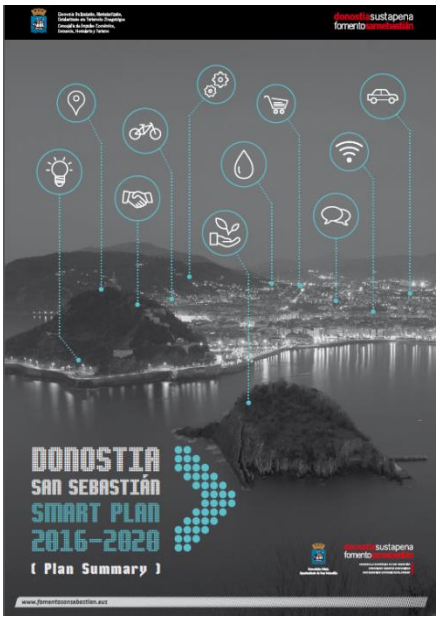
CLEAN is targeted to address how best to meet EU energy efficiency targets for buildings in Europe's regions. The overall objective of the project is to increase energy efficiency results in housing and public infrastructure by an average of 4% by 2022 and stimulate improved engagement between energy stakeholders in European regions.

Particularly, this Action Plan aims to establish the next steps to be developed and deployed in the city of San Sebastián in the sustainable and energy efficiency field in the following years. The actions are based in some of the experiences that has been presented by different regions that are taking part in the CLEAN project, which have been analysed and adapted in this Action Plan in order to be implemented in the city of San Sebastian. These other experiences that have already been put in place in different countries across Europe, are facing similar challenges related to meet energy efficiency targets and city transformation towards a sustainable city. The principal output of this Action Plan has been to select and define the initiatives that will be implemented in the city of Donostia / San Sebastian. The analysis for this selection has considered social, economic, geographic, environmental context of each initiative, key players that need to be involved, technical and economic feasibility of the actions and timeframe required. All these parameters have been aligned with the strategy and implementations that are already considered in the Donostia / San Sebastián Smart City Plan, which also tackles the policy instrument strategies for the energy efficiency improvement.

FSS is the local public society dedicated to the economic and social development and promotion of the city of San Sebastian-Donostia (Spain), through innovation, knowledge generation and transformation, networking, and project fostering and management, all under sustainability criteria.

FSS is leading and driving the transformation of the city's socio-economic model, promoting the development of emerging sectors through the consolidation of the local clustering model, supporting these business sectors in its transformation, through a cohesive organization that works through economically sustainable projects and capitalizes and transfers the knowledge generated.

[1] https://www.interregeurope.eu/clean/
[2] http://www.fomentosansebastian.eus/en/



More specifically, Donostia Smart City is the strategic project of the city for the promotion of social, economic and environmental sustainability. FSS led the creation of the Donostia / San Sebastián Smart City Plan 3, in which nearly 200 agents participated. This Plan has established a strategic line with shared objectives and has defined a Public Action Plan for the period 2016-2020 with which the city effectively implements and plans its city projects in the urban environment with an integrated and Smart perspective. This plan was defined under FP7 programme project STEEP – Systems Thinking for Efficient Energy Planning, together with the cities of Bristol (UK) and Florence (Italy). The Smart City and the action plan have been stablished for the period 2016-2020. The plan takes into consideration the different municipal strategies and projects, European policies and strategies and the background and good practices of the city. The plan will be updated to establish a new agenda for the next years. There are also policies and commitments that impact on the different Municipal Departments that conduct to the implementation of actions focused on the achievement of some long-term measures. The Plan was drawn up by Fomento de San Sebastián with the collaboration of Presidency as coordinator of the Municipal Departments.

Among the smart projects that are currently being implemented, it is worth mentioning the coordination of the European project REPLICATE [4](Lighthouse) of the SCC1 Smart Cities and Communities Europe call, co-financed by the Horizon 2020 program, which aims to develop and validate cities Donostia, Florence and Bristol lighthouse of a sustainable city business model, to improve the process of transition towards a sustainable Smart City in the fields of energy efficiency, sustainable mobility and ICTs / Infrastructures, accelerating the deployment of innovative technologies, improving the quality of life of the citizenship and influencing the replication process.

REPLICATE
RENAISSANCE OF PLACES WITH INNOVATIVE CITIZENSHIP AND TECHNOLOGY

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement Nº 691735

Additionally, FSS promotes local sector dynamization through a clustering policy, having created the Smart Cluster that integrates different institutions and agents such as Technological Centers, Training Centers, Associations and Professional Associations, Financial Institutions and Institutions. Among others, EVE (Basque Energy Entity – Basque Government) is part of the cluster. It aims to find synergies that allow members to be an active part of the evolution and progress in the materialization of the city's smart strategy. The fields of renewable energies, energy efficiency and ICT stand out among others. In this way, FSS supports these business sectors in its transformation, through a cohesive organization that works through economically sustainable projects and capitalizes and transfers the knowledge generated.

donostia smart
SMART KLUSTERRA
CLÚSTER SMART
SMART CITY CLUSTER

[3] Donostia / San Sebastián Smart City Plan
http://www.fomentosansebastian.eus/images/sectores_emergentes/smart-energy/plan_smart/PLAN_SMART_DONOSTIA_EN.pdf
[4] https://replicate-project.eu/. Video: https://www.youtube.com/watch?v=8PxiI8eeZb4

Other initiatives and projects that had been implemented in the last years (some of them co funded by the European Union) related with sustainable and efficiency improvement in the city are:

- **Installation of Renewable Energies** in the city: Photovoltaic panels (28 installations for a total of 1MW) and wind turbines (2 installations).
- **Bioclimatic buildings**[5]: Bioclimatic architecture in new buildings considering bioclimatic parameters to reduce energy demand and renewable energy installation for its consumption. Buildings close to zero emissions: PI@ building, Talent-House, UBA House or Enertic [6]Bioclimatic Center.
- **Consolidation of local smart cluster** (integrating renewables energies and energy efficiency, ICT, etc. sectors). The Enertic Building is a **Sectorial concentrator building** erected as the main hub for the cluster providing services, training, and auditorium facilities, meeting rooms, etc. to the companies of the cluster.
- **i-Sare [7]Micro-grid project**, located in Enertic building and managed by a consortium of public-private entities.
- **District Heating** project design and deployment in Urumea Riverside District. Power plant with 7400 kW of power, with two 1400W biomass boilers. The service is owned by the municipality through FSS.
- **SmartKalea** [8] is a pioneering project is based on different implementations to test and validate a comprehensive model for its expansion to other geographical areas.

In particular, the SmartKalea project **SmartKalea** is the innovative initiative of FSS to establish a public-private collaboration model that integrates the different agents that coexist in a city environment from a Smart/sustainable perspective: citizenship, businesses, technological local companies and Municipal Departments, leaded by FSS. It consists of a pilot project based on Smart implementations to test and validate a comprehensive model for its expansion to other geographical areas and turn Donostia in a Smart City reference.

More specifically, SmartKalea promotes environmental sustainability, energy efficiency, citizen participation and transparency using state-of- the-art technology from local technological partners, integrating data into the project's smart platform for monitoring and obtaining indicators that promote the improvement of the management of the city.

[5] http://www.fomentosansebastian.eus/en/donostia-smart/1811-centros-empresariales
[6] https://www.interregeurope.eu/policylearning/good-practices/item/1133/enertic-smartbuilding-near-to-zero-emissions-building/
[7] http://www2.i-sare.net/en/
[8] http://www.fomentosansebastian.eus/smartkalea/en/

SmartKalea has been recognized with the Smart Cities 2015 Award from the **SOCINFO** Foundation and the **CNIS** (Congreso Nacional de Innovación y Servicios Públicos, Spain) 2017 Award to the best public-private collaboration project.

The objective of the project is to transform Donostia/San Sebastián into a Smart city that improves the quality of life of its citizenship and benefit local companies and businesses, due to the extensive use of ICT and the promotion of environmental sustainability.

The specific objectives are:

- To turn Donostia/San Sebastián into a Smart city that improves the quality of life of its citizenship.
- To achieve greater energy and economic savings in 3 main areas: commerce, housing and infrastructures of the city, maintaining its environmental commitment.
- Foster citizen participation and raise awareness of citizens and commercial sector about energy savings and sustainability
- Generate new business opportunities for companies and technological collaborators: support processes for improving commercial management, external projection, showcase of products/services, etc.

SmartKalea project was launched in 2014 in the Mayor Street, an emblematic street of the Old Town of San Sebastian. The good results of this first pilot have allowed to continue doing implementations and to replicate it in other areas of the city. In 2016 the project has expanded to the whole Old Town and it has been replicated in Altza neighborhood. A funding from the Regional Government (Diputación Foral de Guipúzcoa) is received for the replication in Altza neighborhood. Currently, Sancho el Sabio street is proposed as the new neighbour to achieve the sustainable goals of the project.

The project integrates in a single street of the city different solutions of energy efficiency that requires on a small scale a very high level of coordination and integration that can serve as a pilot experience scalable gradually to the rest of the city.

As mentioned before, the Action Plan establishes the next steps to be given in the city of San Sebastián in the sustainable and energy efficiency field in the following years. These actions will be mainly framed under the SmartKalea project since it allows to have the proper city context

to involve all the necessary stakeholders in the process and use the city as a test-bed to the deploy new solutions that can be easily evaluated and validated to be afterwards replicated to other areas of the city. The initiatives are be based in some of the experiences that has been presented by different regions that are taking part in the CLEAN project, which have been analysed and adapted in this Action Plan in order to be implemented in the city of San Sebastian.

2 General Information

- **Project acronym:** CLEAN
- **Partner organisation:** FOMENTO SAN SEBASTIAN
- **Region:** San Sebastian City, Basque Country
- **Country:** Spain
- **NUTS2 region:** Basque Country
- **Contact:** FOMENTO SAN SEBASTIAN (calle San Roque 120, Donostia P.C.: 20009)
- **Email:** fomentoss@donostia.eus
- **Phone number: +34 943482800**

3 Policy context

The Action Plan aims to impact:

☒ Investment for Growth and Jobs programme

☐ European Territorial Cooperation programme

☐ Other regional development policy instrument

Policy instrument addressed:

Basque Country ERDF Regional Operational Programme 2014-2020 (CCI Number: 2014ES16RFOP021)

Responsible Body for the Policy Instrument: *Department of Treasury and Finance, Regional Government of Basque Country*

The FEDER Operational Program 2014-2020 of the Basque Country is the document that determines the strategy and thematic objectives of intervention in the Autonomous Community of the Basque Country related to the actions co-financed by the European Regional Development Fund (ERDF). Its preparation has been led by the Directorate of Economy and Planning of the Department of Treasury and Finance of the Basque Government.

This policy instrument aims to boost sustainable economic growth in the Basque region by creating quality jobs especially in activities with high added value sectors, and improving the competitiveness of the regional economy through 'smart' and innovative growth initiatives. Almost 90% of the resources are targeted at investments in Thematic Objectives: research, innovation, SMEs, ICT, and low carbon economy, in line with the priorities set by the Europe 2020 Strategy.

Specifically, CLEAN project is concerned with Thematic Objective 4, "**supporting the shift towards a low carbon economy in all sectors**" through investment in the following Investment Priorities
(4a) investments in production and distribution of energy derived from renewable sources;
(4b) support to energy efficiency, smart energy management and renewable energy use in public infrastructure and building and housing;
(4c) as well as promotion of sustainable mobility.

This Action Plan is directed to address energy efficiency thematic (4b) and measures envisaged include: improve energy efficiency and reduce CO2 emissions in the construction of public infrastructure, public buildings and housing stock.

As stated in the Policy Instrument, one of the main shortcomings of the residential park in the Basque Country is in terms of energy efficiency. Therefore, in parallel to the measures to improve efficiency in public infrastructure and buildings, the action in residential housing stock is also key. In this regard, the buildings and homes of the Basque Country have a significant potential for reducing energy consumption and improving energy efficiency, as indicated in the Renovation Plan for Housing 'Plan Renove Rehabilitación Vivienda 2013-2016'.

Therefore, the specific objective of improving energy efficiency in buildings and public infrastructures and services is proposed, trying to advance the savings in total energy consumption in the Basque Country to achieve the 20% savings objective established in the Europe2020 Strategy.

This Plan, whose objectives are aligned with the Europe 2020 Strategy, has as its main objectives to increase the energy efficiency of homes and buildings, improve accessibility conditions, strengthen social cohesion and encourage job creation.

In particular, the initiatives set in this plan are targeted at facing energy efficiency problematic in residential housing, both, by improving building efficiency but also, fostering awareness among residents and commercial establishments of the buildings (*Action 2* and *Action 3*). Furthermore, improving energy efficiency in public infrastructure is also fostered in the initiatives set in this Action Plan (*Action 1*).

The actions that will be promoted and may be funded under this Thematic objective will focus on improving energy efficiency, smart energy management and the use of renewable energy in public infrastructure, including public buildings, and the homes of the Basque Country. Specifically, they may be the following:

• Efficient rehabilitation actions of the housing stock. Funding programs for the efficient rehabilitation of homes and buildings to improve the building envelope.

• Development and / or improvement of infrastructure, buildings and public services for an improvement in energy efficiency. Actions on infrastructure (roads ...), public buildings and public services to improve their energy efficiency, promoting the use of renewable energy and energy sustainable habits.

Consequently, aligned with the aforementioned strategic lines of the Policy Instrument, the objective of the actions envisaged in this Action Plan is to set innovative mechanisms to

stimulate uptake of the measure among home owners, business or public infrastructure including financial instruments and community focus pilots.

FSS, as the promoter of this Action Plan, has the local competence (together with the city Council) to carry out the activities proposed in this plan as the local authority where the initiatives are carried out. These initiatives are specifically designed to respond to the strategic line of Energy Efficiency set by the Basque Government Operational Programme. A continuous connection among Basque Government and FSS is maintained through the Donostia Smart Cluster, promoted by FSS, in which EVE (Basque Energy Entity, Basque Government) participates. Donostia Smart Cluster holds an annual cluster meeting in which CLEAN project status and results achieved are presented.

4 Action: Energy Efficiency improvement through ICT in Donostia / San Sebastian city

4.1 Background

The CLEAN project has allowed FSS to learn about the experiences put in place in various European cities and regions committed to improve energy efficiency. Different initiatives of best practices have been visited across Europe in order to learn in deep the benefits and results obtained in each action, but also to learn how to tackle multiple issues related to the implementation, finance and engagement of citizens and stakeholders involved in the environment.

During phase 1 of the CLEAN project, best practices transfer has been pursued through several Exchange of Experience meetings and visits done to each of the regions, focusing to meet potential experiences to be transferred and replicated in San Sebastián city context.

Particularly, FSS has analysed and identified which are the best practices that are more feasible to be replicated in San Sebastian city environment, considering socioeconomic context, technological context, environmental resources available, etc. Accordingly, Normandy region in France has been visited twice during 1st phase of CLEAN project to learn in deep about their initiatives, since similar context and strategic lines were detected. These experiences have served to inspire new initiatives that require to be adapted to the city context of San Sebastian, which follows the aim to improve energy efficiency and reduce energy demand aligned with the Basque Country ERDF Operational Programme 2014-2020.

Furthermore, local stakeholders have been involved in the whole process taking part in the visits to the different European Countries as well as, exchanging experiences during the meetings and visit organized in San Sebastian. Principally, companies related to ICTs, energy efficiency and building retrofitting involved in the SmartKalea project has taken part in the knowledge transfer process.

4.2 Action 1: Smart public lighting in Sancho el Sabio street

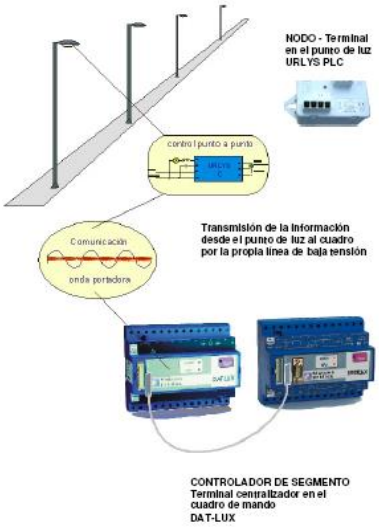
4.2.1 Description of the action

The SmartKalea project will be expanded including a new street as part of the project scope, called Sancho el Sabio Street. The street will be renewed in the pedestrian area of the odd-numbered dwellings, improving the accessibility of the street, renewing it and making the street a closer and more accessible space for pedestrians and shops. The works will therefore include the renovation of all public elements and infrastructure of the street, including street public lighting. Taking advantage of this circumstance, the new lighting to be installed is proposed to be intelligent lighting.

The new public lighting infrastructure of the street will consist of 22 luminaires, with LED system with optics of contracted quality and with a photobiological risk certificate. This LED luminaires with optics, will allow to direct the light so that a better performance is obtained. The luminaries will be placed on poles of 5 meters high at an approximate distance of 17 meters. The circuit for the lighting supply will be underground. In addition, it will have a Smart System consisting in the control of point-to-point lighting points. Its implementation in the Public Lighting network will allow tele-management, inventory, corrective maintenance, preventive maintenance and energy saving management. It will also comply with the CE Regulations and the Low Voltage Electrotechnical Regulation in force.

The system will improve:

- the control and recording of electrical parameters
- energy saving in
  - control and elimination of night over-voltages
  - reduction of lighting during low usage hours
  - fine adjustment of on and off
  - power factor control
  - reduce costs of replacement of lamps for stabilizing over-voltages
- and maintenance functions will
  - improve the quality and safety of the facilities, by detecting in real time the damage allowing rapid actions
  - In addition, it optimizes the maintenance costs with plans that allow to avoid repetitive failures.



Moreover, the intelligent system will include an automatic regulation system based in presence, calendar, environmental parameters, etc. This system will be based on detection technology that enable motion detection of people and/or vehicles. The detector (radar or vision system) is an electronic device that detects presence and generate motion information for the system.

Additionally, the luminaires on the sidewalk of even buildings will also be modified adapting them to LED lighting with the change of 19 luminaires.

This intervention will help improving public infrastructure efficiency, promoting energy sustainable habits in the public service. Therefore, this initiative addresses one of the strategic axes defined in the Policy Instrument to tackle energy efficiency objectives defined. In addition, this pilot initiative is easily scalable to other sites of the city, considering that the public lighting infrastructure will be renovated gradually into a smart public lighting where energy consumption and CO2 emissions will be reduced considerably.

4.2.2 Background

This action has been inspired by the Good Practice from North Karelia (Finland) called *Smart Led Streetlights of Penttilän-ranta* [9] that has been presented by the Regional Council of North Karelia.

Their action has been deployed in Penttilänranta a new residential district of the 4.000 people in the City Centre of Joensuu. One of the improvements is the street lightning of a 1 km walkway for pedestrians and cyclists, with 50 streetlights. The lights have been changed to dimmable ones with motion sensors via Lumine Lightning Solutions. When a by-passer gets close to the lamp its brightness rises from its basic 10 % level. The lamp stays then at maximus brightness for a short while. When the pedestrians or cyclist has moved past, the light dims back to the basic 10 % level.

[9] https://www.interregeurope.eu/policylearning/good-practices/item/1778/smart-led-streetlights-of-penttilaenranta/

It was considered that the Good Practice proposed by the Finish partners could be easily replicated in San Sebastian since there was not particular context to take into account that would make not suitable for the implementation in the city of San Sebastian. For example, it is important to have clear that the difference in climate of the two countries does not affect in the action in particular.

In Sancho el Sabio street, a similar intervention is also to be done with the renewal of the pedestrian area to improve the accessibility of the street. So, taking the advantage of that renovation of several public elements and infrastructure of the pedestrian area, the idea of deploying a smart lighting installation similar to the good practice put in place in Joensuu was also considered for this street as part of the Action Plan, which will not just include LED lighting but also movement detection and smart management system which will improve municipal public infrastructure making it more efficient and reducing its CO2 emissions.

4.2.3 Players involved

The different actors involved in the action are:

- Municipality of San Sebastian, through the Department of Projects and Works as principal managers of the intervention. Maintenance and Urban Services Department is also involved in the action, since the Luminary Section of the Department will be the owner and responsible of the maintenance once the installation is finished.
- Fomento San Sebastian supporting the intervention of the smart public lighting in order to foster energy efficiency improvement of the public infrastructure and reduce energy consumption and CO2 emissions.
- Awarded company in the tendering process for the deployment of the whole intervention.
- Specialized company in smart public lighting, which will be responsible of the installation of the whole system.
- Citizens: as beneficiaries of the new infrastructure

4.2.4 Costs / Budget

Intelligent public lighting cost will consider the modification of new luminaires and smart system. However, all the underground installation and electrical wiring of the system will also be renewed in this case, which is not considered in the total amount of the budget. Additionally, works for the whole intervention are not included in this budget since it will part of the whole urban renewal of the street.

Concept	Cost (€)	Funding source
Luminaires (sidewalk of odd buildings)	31.100 €	Funded by San Sebastian city council as part as the whole renewal of the street infrastructure (does not include intelligent lighting)
Luminaires (sidewalk of even buildings)	19.100 €	Funded by San Sebastian city council as part as the whole renewal of the street infrastructure (does not include intelligent lighting)
Nodes, heads, radars Nodes telemanagement STD (21 units. 2.100€) Inteligent LLAN Nodes (20units. 3.0005€)	16.500 €	Pilot Action request is done for the installation of this concept by Fomento de San Sebastian to

Radar detector (20 units. 3950€) Head with embeded PC (1unit 1400€) installation of the components (61 units 3.300€) signal conversor 1-10v (41 units 3.050€) Nodes telemanagement STD (21 units. 2.100€) Inteligent LLAN Nodes (20units. 3.0005€) Radar detector (20 units. 3950€) Head with embeded PC (1unit 1400€) installation of the components (61 units 3.300€) signal conversor 1-10v (41 units 3.050€)		Interreg Europe Programme for the inclusion of the 'intelligence layer' to the pilot
<u>Smart system:</u> control and communication system with automatic control with presence detection.	5.200 €	Pilot Action request is done for the installation of this concept by Fomento de San Sebastian to Interreg Europe Programme for the inclusion of the 'intelligence layer' to the pilot
Total	***72.200 €***	
Total Pilot Action requested to Interreg Europe Programme	***22.000 €***	

Note: human resources of Fomento San Sebastian and Municipal departments is not included in the previous breakdown.

4.2.5 Funding sources

Municipality of San Sebastian and Fomento San Sebastian will fund the intervention of the renovation of the pedestrian area of the street, which includes the renovation of the public lighting. Fomento San Sebastian will promote the "intelligent layer" of the public lighting infrastructure to develop a "smart public lighting" for Sancho el Sabio street, for which a funding for this Pilot Action is requested to Interreg Europe programme (22.000€).

4.2.6 Timeframe

The project is foreseen to be deployed in 18 months. Before the starting of the whole intervention of the street renewal, some agreements need to be reached with the neighbours of the street in relation to the waterproofing of some gardening areas that are private.

The whole intervention will not be deployed at the same time, but instead, it will be divided in 3 zones in the odd side of the street and the even side apart, in order to reduce the inconvenience for the pedestrian mobility.

Concept	Dates	Responsible	Stakeholders and community
odd side - block 1 - Excavation - piping and casket deployment - Filling soil - Foundation of columns - bolt installation templates for the columns - Columns and luminaires installation - Luminaires wiring	Jan20-Mar20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian, owners of buildings in block 1
odd side - block 2 - Excavation - piping and casket deployment - Filling soil - Foundation of columns - bolt installation templates for the columns - Columns and luminaires installation - Luminaires wiring	Apr20-june20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian, owners of buildings in block 2
odd side - block 3 - Excavation - piping and casket deployment - Filling soil - Foundation of columns - bolt installation templates for the columns - Columns and luminaires installation - Luminaires wiring	jun20-sept20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian, owners of buildings in block 3
Even side -Installation of new columns and luminaires	Sept20-oct20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
New lighting control panel and protection installation	oct20-nov20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
Intelligent control nodes installation in luminaires	oct20-nov20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
Movement sensor installation in luminaires	oct20-nov20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
Control nodes connection to luminaires and sensor drivers	oct20-nov20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
Intelligent control head installation	oct20-nov20	Awarded company in the tendering process	Department of Projects and Works, Fomento San Sebastian
Intelligent control system launching	dec20-feb21	Awarded company in the tendering process	Department of public lighting, Fomento San Sebastian
Control system integration in the platform	dec20-mar21	software development company	Department of public lighting, Fomento San Sebastian
Monitoring	mar21-june21	Fomento San Sebastian	

4.2.7 Impact expected

It is expected that the intervention will allow to have savings of 74% due to the renovation of the conventional luminaires to LED lighting, 53% of savings thanks to presence detection, 75% in management and maintenance due to an increase in the lifespan and remote management, which results in a total saving of 80% in energy consumption and reduction of CO2 emissions.

Estimated savings are based for one hand considering average LED technology consumption (compared to the conventional luminaires) and for the other hand considering that at night, pedestrian presence at the zone will descend dramatically, so maintaining the luminaires at 50-80% of the power when no movement is detected, will allow to obtain such savings. In any case, this savings will vary depending on the real presence in the street during the night and the light power selected by the municipal department in charge of the public lighting.

4.3 Action 2: Improving Energy Efficiency for families and commerces

In order to improve energy efficiency in buildings, individual and particularized energy efficiency consultancy service will be made available to retailers and homes. This initiative does not only foster energy efficiency of the buildings (energy and money saving) but also seeks to increase awareness among citizenship in relation to efficiency and sustainability. For that expert consultants on energy efficiency will visit their homes and commercial establishments to integrally analyse how they are consuming energy and water currently and how they can reduce their demand by multi-level saving measures such as, changing habits, optimize installation, equipment and machinery.

Besides the advisory, energy consumption will be monitored in a comprehensive platform to support experts analysing homes and establishments consumption and to help visualizing citizenship how they are consuming. Monitoring of electric consumption will be done by installing energy meters or tracking energy consumption from electric distributor directly. That platform will provide valuable information such as how much they are consuming comparing to similar homes of commerces (depending people living at home, type of shop, etc.), so that it can encourage to improve their efficiency performance.

The target group for this energy efficiency initiatives will be based on Sancho el Sabio street residents and businesses of Donostia / San Sebastian. It is considered that focusing our target group in one unique street the impact reached can be higher. A goal of 20 homes and commerces is foreseen to be reached.

This action will also include a grouping among the participants of this action in the street, in order to purchase 100% renewable electric energy jointly so that for they can obtain better energy prices and helps improving environmental sustainability and create an ‘energy efficient’ community.

The action will start with the communication process to inform the potential beneficiaries of the action. This will consist on informing through different channels (letters, online, group sessions, door-to-door communication) to all the neighbours and commerces of the Sancho el Sabio street about the initiative and how to enrolling to the process.

The initiative will help facing energy efficiency problematic in the residential park of the Basque Country by fostering awareness among residents and commercial establishments through promotion of energy sustainable habits. Therefore, this initiative addresses one of the strategic axes defined in the Policy Instrument to tackle energy efficiency objectives defined.

4.3.1 Background

This action has been inspired by the two Good Practices presented in Normandy (France) called *Challenge 'positive energy families'*[10] from CLEAN project partner *Les 7 Vents*.

The 'positive energy families' challenge tackles the energy savings that can be achieved by changing the behaviour of individuals and to pave the way for other actions to improve energy efficiency. It takes the form of a competition that encourages teams of families to save energy through everyday actions. They progress together with a facilitator and a specially trained volunteer "captain" to assist the householders during the heating season. They are equipped with a guide of 100 eco-gestures, measuring equipment and a web platform to monitor their consumption. They deepened their knowledge and understanding of their mechanisms of consumption. Actions are both individual and collective in the sense that they create a community of practices.

FSS has identified this best practice particularly interesting to be replicated in San Sebastian city environment, considering feasible from a socioeconomic perspective, technological perspective, available resources, etc. For this reason, Normandy region in France has been visited twice during 1st phase of CLEAN project to learn in deep about their initiatives, since similar context and strategic lines were detected.

Normandy's experience has served to inspire our own initiative that require to be adapted to the city context of San Sebastian, which follows the aim to improve energy efficiency and reduce energy demand. In the case of the action presented in this plan, the initiative will not follow a competition form but however will have the very same ingredients to improve energy efficiency in homes and commerces and also raise awareness among them. For that specialised advisory, energy and water monitoring, and joint collaboration for energy purchasing is proposed. Additionally, all the community can learn from each other's experience in improving their energy efficiency since all of the participants are located in the very same street.

4.3.2 Players involved

The different actors involved in the action are:

- Fomento San Sebastian, as principal promoter of the action
- Municipality of San Sebastian, particularly the Environmental Department, which is in charge of carrying out energy efficiency advisory for residents

[10] https://www.interregeurope.eu/policylearning/good-practices/item/125/challenge-positive-energy-families/

- Commerces and homes, as principal beneficiaries of the action, but also that need to be eager to improve their energy efficiency and invest time. Their participation is optional in any case.
- Consultants/companies as experts in energy efficiency that will provide advisory, monitor energy consumption, provide saving measures, etc.

4.3.3 Timeframe

It is expected that the whole initiative will be implemented in 12 months timeframe.

Concept	Dates	Responsible	Stakeholders and community
Kick-off meeting with Fomento San Sebastian and external experts that will provide advisory	Jan-Feb 2020	FSS	Energy Efficiency expert
Communication of the initiative to the residents and commerces of Sancho el Sabio Street -Letters, posts, web, … dissemination -Face-to-face meeting with residents and commerces	Mar-Apr2020	FSS	residents and commerces of the street
Participants sign-up period to the initiative	Apr-May 2020	FSS	residents and commerces of the street
Individual advisories to the participants	May-Aug 2020	Energy Efficiency expert	residents and commerces of the street
Consumption monitoring: consumption platform and reports of the proposed recommendations for energy efficiency and savings	Sept 2020-Jan 2021	Energy Efficiency expert	residents and commerces of the street

Following period will be dedicated to analyse the overall success of the initiative: key points, lessons learnt, problems detected, improvements to be done, scalability and replication of the action.

4.3.4 Costs / Budget

Budget for contracting expert services for energy efficiency advisory is considered in this budget. Additionally, cost for smart meter installation is also considered for cases some commercial establishments where there is not possibility to obtain consumption data from the energy supplier directly.

Potential investments that commerce or home owners may done to reduce their energy demand, such as changing lights to LED luminaires, changing machinery and equipment (refrigerating machines, fridge, water flow reducers, etc) is not considered in this budget, since it would be individual expenditures.

Concept	Budget	Units	
Expert Advisory on Energy Efficiency	200 €	20	4.000€
Reports	350 €	1	350€
Smart meters	240 €	5	1.200€

Grouping for energy purchasing	1.500 €	1	1.500 €
Energy data monitoring platform	1.400 €	1	1.400 €
Follow up of energy measures (6 monthly)	120 €	20	2.400 €
Total			**10.850€**

Note: human resources of Fomento San Sebastian and Municipal departments is not included in the previous breakdown.

4.3.5 Funding sources

Fomento San Sebastian will fund the biggest percentage for the energy efficiency activities for commerces and overall monitoring platform management. In the case of residential dwellings, the Municipal Environmental Department will be in charge of the individual advisory for them and will fund that percentage.

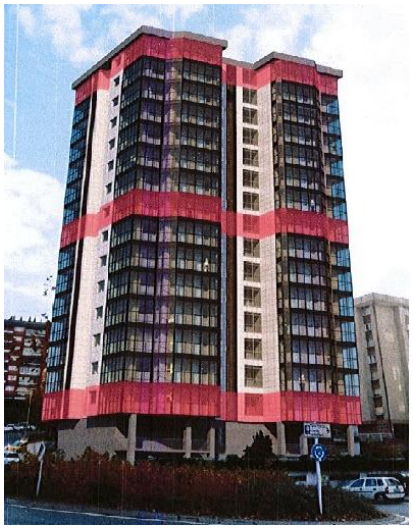
Both Fomento San Sebastian and Municipal Environmental Department has the local authority and budget line to undertake this action aiming to promote energy efficiency in buildings in line with the regional operational programme.

4.3.6 Impact expected

Thanks to the experience obtained, the replicability of the project in other neighbourhoods can lead to energy saving and consumption reduction results in a shorter period since it can benefit from the know-how obtained: previous coordination between the different local public-private actors involved, a proven work methodology, good practices, savings measures depending on the type of housing and business, etc.

4.4 Action 3: ICT inclusion in a Building retrofitting for the Energy Efficiency improvement

Efficiency of the buildings is at the core of the CLEAN project objectives. In this context, in the city of San Sebastian many residential buildings present low energy performance so encouraging building energy retrofitting is considered a major initiative to improve efficiency and reduce energy consumption and CO2 emissions in the city. This action will be focused on using technology to gather data in order to obtain best practices and lessons learnt that will facilitate, improve and encourage to take a building retrofitting intervention in residential buildings.



The community of owners of the private residential building of Paseo de Larratxo 94 building in Altza neighbourhood (San Sebastian), one of the SmartKalea pilot sites, has decided to carry out Energy building retrofitting. It is an isolated building with 75 dwellings that has facing brick walls with glass areas on balconies. The intervention proposed for this building consists of an Energy Rehabilitation in the building envelope with a combination of ventilated ceramic façade (36% of façade surface), Exterior Insulation Finishing

System- EIFS (12% of the the façade), and curtain wall as enclosure in balcony areas (52 % of the façade).

In order to encourage and strengthen energy refurbishment additional ICT layer is proposed to be included to the initiative that will allow monitoring of the situation of the building and homes in terms of consumption, comfort, etc., as well as other investments to improve the performance of the or support the promotion of self-energy consumption through the installation of renewable energy in the building. [11] In particular the analysed interventions that are proposed to be implemented are the following:

- Characterization of each of the dwellings of the building of Larratxo 94. This characterization is necessary to define particularities and restrictions of this construction for the replicability of the initiative in other Community owners that want to have similar interventions with similar characteristics.
- Installation of an energy monitoring and control system, which allows real-time comfort and energy consumption monitoring of the building. The monitoring can measure the following parameters: temperature, humidity, CO2, heating consumption, consumption / cost evaluation. The aim is to have real-time consumption data that stimulate awareness and savings, which can allow to generate a virtual model to study cost-optimal rehabilitation actions for similar typology houses.
- Installations of home automation systems with direct applications in energy saving of homes, as well as improving comfort and accessibility of its users. For example: window sensor, smart plug, temperature sensor, energy monitor, home automation screen, etc.
- Individual water consumption monitoring. Individual meters would allow to obtain home water consumption individually so that families can know how much are consuming exactly.
- Practical recommendations of actions to be carried out in the installations of each dwelling (lighting, heating, gas boiler, electric heating, electrical appliances, faucets, showers, or others).
- Energy optimization actions in the community.
    - ✓ Intelligent LED lighting installation in common areas.
    - ✓ Installation of equipment to measure external temperature and humidity.
- Renewable energy installations in the community.
    - ✓ Solar photovoltaic panels installation (P= 15kW) for self-consumption of common spaces and batteries.
    - ✓ Mini wind turbine (vertical axis) installation (P=1,1 kW) for self-consumption of common spaces.
    - ✓ Solar thermal panels (panel area of 50m2) for individual ACS heating.
    - ✓ Aerothermal for individual ACS heating (6 aerothermal generators P = 15kW).
    - ✓ Other installations have not been considered due to the difficulties in space or lack of efficiency of the installations (geothermal installation, centralized heating, charging points for electric/hybrid vehicles).

Both, retrofitting of the building and installation of ICT systems and renewable energy solutions will depend on the economic capacity and interest of the community of owners that wants to

[11] The analysis of these actions has been done by an external company in the CLEAN project framework. A complete report has been delivered by the external company which has served to detect and analyse all the possibilities that can be installed in a residential building.

address this kind of activities. Community of owners of the buildings will have the final decision about which intervention and solutions to implement.

In that sense, Fomento San Sebastian has supported with a preliminary analysis of the intervention proposing ICT solutions to improve energy efficiency as well as renewable energy installation and can support with further analysis that may be necessary for the installation of these solutions.

Summarising, this action will allow to elaborate a first idea on how to face a building retrofitting intervention globally, including an analysis of the business model possibilities for this kind of interventions.

The initiative will help facing energy efficiency problematic in buildings by improving energy efficiency of the building envelope, fostering awareness among residents through promotion of energy sustainable habits. Therefore, this initiative addresses one of the strategic axes defined in the Policy Instrument to tackle energy efficiency objectives defined.

In order to fund the building rehabilitation of Larratxo 94, community of owners of the building and the owners of each dwelling particularly will be able to to ask for aids and tax deduction for the improvement of the building envelope efficiency to Etxebide (Building department of the Basque Government) as defined in the Operational Programme of the Basque Country.

4.4.1 Background

This action has been inspired by the Good Practice presented in Normandy (France) called *Serious game 'renovation challenge'* [12] from CLEAN project partner *Les 7 Vents*.

The serious game "challenge renovation" allows to interact with the general public on the issues of global retrofitting in buildings. It consists on an animation tool intended to illustrate the fact that low consumption is achievable in renovation. It thus benefits from a first approach for its technical and financial choices. During the simulation, an energy consultant contacts the user. This device of diagnosis makes it possible to apprehend the renovation of a type of house predominant in Normandy: of the 70s in cinder block, little insulated and heated with fuel oil. It gives readability to the objectives of low-energy renovation and brings the citizens to take their first steps towards their realisation.

FSS has identified this best practice particularly interesting since building energy efficiency and building retrofitting is at the core of the strategic line of the *Basque Country ERDF Regional Operational Programme 2014-2020* and represents major problem for the residential buildings of the city of San Sebastian. For this reason, Normandy region in France has been visited twice during 1st phase of CLEAN project to learn in deep about their initiatives, since similar context and strategic lines were detected.

Normandy's experience has served to inspire our own initiative that require to be adapted to the city context of San Sebastian. In the housing stock in San Sebastian there is also predominant constructions of the 50-70s that are very poorly insulated. In this context, a big number of

[12] https://www.interregeurope.eu/policylearning/good-practices/item/124/serious-game-renovation-challenge/

community of owners are deciding to have their building energetically renovated in order to follow the national and regional regulation. With the objective to boost building retrofitting intervention, this action aims to easily show and demonstrate the benefits of taking this type of interventions and facing the building retrofitting with a holistic approach to carry out additional actions to improve energy efficiency of the building as much as possible, such as, renewable energy installations and ICT solutions installation to monitor building and homes consumptions.

4.4.2 Players involved

The different actors involved in the action are:

- Community of owners of Larratxo 94 building: owners that will undertake a retrofitting intervention in their residential building.
- Construction firm in charge of carrying out energy building retrofitting
- Fomento San Sebastian supporting ICT and technology installation in the building so that it can improve building retrofitting intervention and gather valuable data to serve for other building retrofitting interventions in the city with good practices and lessons learnt.
- Idom engineering company: supporting with a previous analysis of the retrofitting in order to include technology and renewable energy installation.

4.4.3 Timeframe

It is expected that the intervention will last two years. In particular, building retrofitting intervention will be the first step of the initiative which is now waiting for a modification in the municipal regulation in order to be approved by the city council of San Sebastian.

Concept	Dates	Responsible	Stakeholders and community
Characterization of each of the dwellings of the building of Larratxo 94	Oct-Dec 19	External expert + FSS	Community of owners of Larratxo 94
- Modification in the municipal regulation - Approval of the building retrofitting project of Larratxo 94 block by the city council	Jan-June 20	City council	Community of owners of Larratxo 94, Construction firm in charge of the project
Retrofitting works - EIFS system - ventilated facade - Curtain wall for balconies	June20-June21	Construction firm	Community of owners of Larratxo 94
Technological solutions installation in homes or in the common spaces -Installation of an energy monitoring and control system, home automation systems - Individual water consumption metering system installation - Practical recommendations elaboration to improve efficiency	Jan-June 21	Fomento San Sebastian	Community of owners of Larratxo 94, Municipal Water Service deparment
Monitoring and assessment of the technological solutions installed	Jun-oct 21	Fomento San Sebastian	Community of owners of Larratxo 94

4.4.4 Costs / Budget

The following budget includes reference costs of the installation of diverse solutions that can furtherly improve energy efficiency of the building when doing a building renovation. Each

solution is estimated separately since there is no necessity to implement all together. Each neighbour by its own, or the community of owners will decide which intervention to carry out.

concept	**aprox. cost (€)**
Water consumption monitoring through smart meters	120 € / per home
Integral domotic system	650-900€/ per home
Monitoring of outside temperature and humidity	450 €
Solar photovoltaic panels installation for self-consumption and batteries	20.000 €
Mini wind-turbine installation for self-consumption	16.000 €
Solar thermal panels installation for self-consumption	150.000 €
Aerothermal for individual ACS heating	95.000 €

4.4.5 Funding sources

The intervention for the energy retrofitting of the private residential building of Paseo de Larratxo 94 building in Altza neighbourhood will be funded by the community of owners of the building. However, both Community of owners jointly and each owner particularly, will be able to ask for aids and tax deduction for the improvement of the building envelope efficiency to Etxebide (Building department of the Basque Government) as defined in the Operational Programme of the Basque Country).

The installation of ICT system and energy efficiency improvement solutions will also be funded privately, by each owner, or by the community of owners globally.

Fomento San Sebastian or other municipal departments could also support in particular interventions or in further analysis that may be necessary for the installation of these solutions.

4.4.6 Impact expected

Improve building retrofitting process by analysing ICT solutions and renewable energy installations that can allow to have an integral improvement of the efficiency of the building.

4.5 Action Monitoring

Monitoring of the actions will be ensured by a periodic follow-up of the interventions.

Regular meetings will be done with each of the stakeholders involved in the meeting, both group and individual meetings in order to review the status and progress of the actions, the deviations and risk points detected and to plan the following steps and deadlines to be reached. Meetings will be physical since stakeholders involved in the actions are local. Additionally, continuous communication will be maintained via phone calls or mails.

Date: 11/12/2012

FOMENTO DE SAN SEBASTIAN, S.A.

EUKEN SESÉ SARASTI, General Manager

Signature:

Stamp of the organisation:

FOMENTO DE SAN SEBASTIAN, S.A.
DONOSTIAKO SUSTAPENA, S.A.